



Department for  
Science, Innovation  
& Technology

# Insights from the UK-wide survey of the Research and Innovation Workforce 2022

Ipsos and Warwick Institute for Employment  
Research

BEIS/DSIT Research Paper Number 2023/004

March 2023



© Crown copyright 2022

This publication is licensed under the terms of the Open Government Licence v3.0 except where otherwise stated. To view this licence, visit [nationalarchives.gov.uk/doc/open-government-licence/version/3](https://nationalarchives.gov.uk/doc/open-government-licence/version/3) or write to the Information Policy Team, The National Archives, Kew, London TW9 4DU, or email: [psi@nationalarchives.gsi.gov.uk](mailto:psi@nationalarchives.gsi.gov.uk).

Where we have identified any third-party copyright information you will need to obtain permission from the copyright holders concerned.

Any enquiries regarding this publication should be sent to us at: [researchpeopleandculture@beis.gov.uk](mailto:researchpeopleandculture@beis.gov.uk)

## Foreword by George Freeman MP, Minister for Science, Research and Innovation

To be a science superpower and an innovation nation requires the UK to inspire, attract, train, support and retain outstanding research talent. Equipment, funding, and buildings are key, but our people and research culture are key to our global credibility and impact.

When we published our R&D People and Culture Strategy in Summer 2021, we were clear that in order for the UK to achieve our global science and technology superpower ambitions, we need a world-class research and innovation workforce. We have already delivered on a range of actions: from the sector-wide consultation on the New Deal for Postgraduate Research, to the publication of the Bureaucracy Review, to the launch of the GREAT Talent campaign to attract top international talent to the UK.



In partnership with the UK's research and innovation sector, I look forward to building on these successes and delivering on our commitment to everyone working in R&D to make the UK the best place to pursue their ambitions. This includes ensuring that careers in R&D are dynamic and sustainable, that our visa and mobility system enables talented individuals and teams to come to the UK, and that we have an attractive fellowship offer.

The R&D People and Culture Strategy also committed to the first-ever UK-wide survey of our research and innovation workforce, and the publication of this report marks an important milestone in our implementation.

The report's findings resonate with the many ongoing discussions I am grateful to have had with talented researchers, innovators, technicians and engineers across the UK. They illustrate that the UK is widely seen as a great place to work to pursue research and innovation ambitions, which is something we should all take pride in. However, they also show where we must go further and do more. This survey highlights that R&D is still disproportionately male, that research bureaucracy in academia is high, and that ease of international mobility is key. Making sure we increase diversity in the workforce, improve research culture and focus on attracting and retaining talented individuals and teams are fundamental to the success of the UK's research and innovation endeavour.

This report gives us, for the first time, a comprehensive picture of our research and innovation workforce, and it will help to inform our ongoing and future work to make the UK the best place in the world to live and work in research and innovation. Thank you to everyone who responded to this survey, and I look forward to continuing to working with the entire sector to realise our bold ambitions for UK R&D.

# Contents

|  |    |
|--|----|
| 1. Executive summary                                       | 6  |
| 1.1 Rationale for the R&I Workforce Survey                 | 6  |
| 1.2 Key themes   | 6  |
| 1.3 Key findings   | 7  |
| Characteristics of the R&I workforce in the UK             | 7  |
| Background, skills, and career paths                       | 8  |
| Research and Innovation Impact                             | 9  |
| Working conditions, career incentives and motivations      | 10 |
| 2. Introduction  | 11 |
| 2.1 Background to the research and objectives              | 11 |
| 2.2 Sample frame   | 12 |
| Considerations when defining eligibility                   | 12 |
| Approach to defining eligibility                           | 12 |
| 2.3 Methodology and recruitment                            | 13 |
| Recruitment  | 13 |
| Fieldwork  | 14 |
| 2.4 Analysis and weighting                                 | 14 |
| 3. Characteristics of the R&I workforce                    | 16 |
| 3.1 Employment Status                                      | 16 |
| Employment status by sector                                | 16 |
| Employment status by demographics                          | 17 |
| Employment status by qualification                         | 18 |
| 3.2 Sector   | 18 |
| 3.3 Occupation   | 20 |
| 3.4 What type of work do R&I workers do?                   | 22 |
| Types of R&I activity undertaken                           | 22 |
| Academic disciplines and industry groups                   | 28 |
| Work on globally competitive technologies                  | 29 |
| 3.5 Region   | 33 |
| 3.6 Socio-demographic characteristics of the R&I workforce | 37 |

|   |    |
|---|----|
| 4. Skills, qualifications and career paths of the R&I workforce                   | 41 |
| 4.1 Current skills needs of the workforce   | 41 |
| Skills needed for current job   | 41 |
| Skills needed for career progression  | 43 |
| 4.2 Qualification levels  | 45 |
| Education levels  | 45 |
| 4.3 Career length in R&I  | 47 |
| 4.4 Sector mobility   | 49 |
| 5. Working conditions and career incentives and motivations for the R&I workforce | 52 |
| 5.1 Incentives in pursuing a career in UK R&I                                     | 52 |
| Reasons for taking up current job   | 52 |
| Obstacles R&I workers face to advancement and mobility                            | 55 |
| 5.2 What is the working culture that R&I workers experience?                      | 55 |
| Views on working culture  | 55 |
| Administrative tasks and processes  | 57 |
| Working hours   | 59 |
| Remote working  | 59 |
| 5.3 Grants and Government Support   | 59 |
| 5.4 International mobility and how the UK can attract global talent               | 62 |
| Working outside the UK  | 62 |
| Barriers to working in the UK   | 69 |
| 6. Impact   | 72 |
| 6.1 Types of impact   | 72 |
| Outputs over the last 12 months   | 72 |
| 6.2 Suggestions for supporting impactful research                                 | 75 |
| 7. Conclusions  | 77 |

# 1. Executive summary

## 1.1 Rationale for the R&I Workforce Survey

Boosting innovation is one of the Government's key priorities. As well as driving economic growth and raising living standards, it forms a key part of the Government's plans for building back from the COVID-19 pandemic<sup>1</sup>, and driving productivity across the public and private sector. The Government's R&D Roadmap recognised that a skilled and productive workforce is crucial for achieving this goal and, in July 2021, the Government published its R&D People and Culture Strategy, setting out how the UK will attract, develop, and retain the diverse range of talented individuals and teams that are needed to realise the UK's science superpower ambition.

The aim of this research project was to undertake the first survey taking in all sectors of the wider research and innovation (R&I) workforce. This enables the Department for Science Innovation and Technology (DSIT) to improve strategic analysis of current and future R&I policies designed to develop talent and skills, attract people to work and remain in the UK R&I workforce and ensure that the working environment is diverse and inclusive.

## 1.2 Key themes

The first of its kind, this survey gives policymakers an in-depth insight into the R&I workforce in the UK, covering members of both the innovation and research and development workforces. The survey achieved a total sample of 7,519 respondents from a range of backgrounds, including different sectors and occupations within R&I. From academic researchers, laboratory technicians, software developers, market researcher to CEOs and senior management, this survey shows that the R&I workforce is a broad and varied category of employees. It provides a variety of information about motivations for choosing to work in R&I, career paths and skills as well as the R&I outputs that the UK benefits from. This bespoke survey will increase the usefulness of existing datasets; improve the evaluation of the People and Culture Strategy; and enable better analysis and decision making for the wider R&D system. Key statistics covering all elements of the survey are listed in section 1.3. The key insights and their policy implications are:

- **Research, development and innovation policies need to consider the entire research and innovation workforce.** By allowing respondents to self-define if they are part of the R&I workforce, this survey covers both R&D and innovation workers, which gives a better coverage of workforce issues. Attention should be paid to the entire R&I ecosystem including workers who mainly focus on commercialisation, this survey shows

---

<sup>1</sup> HM Treasury (2021). *Build Back Better: our plan for growth*. From: <https://www.gov.uk/government/publications/build-back-better-our-plan-for-growth>

the wide range of roles that produce innovation outcomes. The occupation level data produced in this survey will be used to tailor policies more precisely.

- **The R&I workforce is highly educated, skilled and mobile, and there are opportunities to make UK R&I more attractive to work in.** R&I workers require a range of soft, technical and specialist skills and the majority hold post-graduate degrees. As their qualifications and skills are highly sought after, they are also highly mobile both in terms of sectoral and geographical (international) movement (e.g., 52% worked outside the UK over the course of their career in R&I). Inward and outward international mobility of talent can be beneficial to the UK. UKRI's report on Global Talent shows that international mobility can contribute to increased research skills, career progression, quality, and quantity of outputs.<sup>2</sup>
- **There is potential to improving diversity of the R&I workforce to better reflect the UK population not only to improve work culture, but also increase innovation in teams and help the UK to meet business demand for more R&I workers.**<sup>3</sup> The R&I workforce is disproportionately male (71%). Female and certain ethnic minority R&I workers are less likely to agree that their workplace supports diversity and inclusion. There is an opportunity to increase innovation by encouraging a more diverse range of people into the innovation workforce.

With a growth in R&D occupations in recent years, and with many other countries pledging an increase in their R&D spending, the international demand for talent will continue to become even more competitive. The Government is continuing to work closely with the UK's R&D sector to deliver the actions set out in the R&D People and Culture Strategy that will make the UK the best place in the world for talented individuals and teams to pursue their R&D ambitions.

## 1.3 Key findings

### Characteristics of the R&I workforce in the UK

- **Range of research and innovation activities:** R&I workers can be engaged in a multiplicity of research activities. Out of the total sample of 7,519 respondents, 80% said they were engaged in applied research, which also took up the greatest share of respondents' working time. Altogether, 95% of the R&I workforce carried out at least one of the three core R&D activities (basic research, applied research, or experimental development) in their job role.

---

<sup>2</sup> UKRI (2022). *Global mobility of research personnel*. From: <http://www.discover.ukri.org/global-mobility-evidence-report-22/index.html>

<sup>3</sup> CaSE (2014). *Improving Diversity in STEM*. From:

<https://www.sciencecampaign.org.uk/resource/ImprovingDiversityinSTEM2014.html>

Schneider, J. & Eckl, V. (2016), *The Difference Makes a Difference: Team diversity and innovative capacity*.

From: [https://www.oecd.org/sti/015%20-%20SKY\\_Schneider\\_Eckl\\_201607025.pdf](https://www.oecd.org/sti/015%20-%20SKY_Schneider_Eckl_201607025.pdf)

Cook, L. D. (2020). *Policies to Broaden Participation in the Innovation Process*. From:

[https://www.brookings.edu/wp-content/uploads/2020/08/Cook\\_PP\\_LO\\_8.13.pdf](https://www.brookings.edu/wp-content/uploads/2020/08/Cook_PP_LO_8.13.pdf)

However, a large proportion of the workforce (60%) also spent time on R&I activities beyond the Frascati definition of R&D, and for 25% of our respondents, these wider activities took up the majority of their working time. Nearly half of the workforce (46%) carried out work relating to R&D or innovation management and one-third (34%) engaged in market research of potential users, marketing or competitors.

- **Personal characteristics:** Around eight in ten (81%) R&I workers in the private sector were men. Women were better represented in Higher Education, but even here around six in ten (62%) respondents were male. Differences in occupation and sector by ethnic group are modest, except that respondents from the Asian/Asian British group are more likely to work in the NHS than other ethnic groups.

## Background, skills, and career paths

- **Highly educated:** The majority of respondents were educated to a much higher level than the UK's workforce as a whole and were qualified at degree level or above. Nearly six in ten (58%) respondents had a doctorate, compared with 2% of the UK workforce overall, and three-quarters of respondents (76%) reported a post-graduate level of educational attainment.
- **Highly skilled:** Respondents were asked to rate the importance of various skills for their current role. Three-quarters of respondents (75%) indicated that communication and working with people was the most important skill for their current job. This was followed by specialist and technical knowledge (67%), leadership (61%), analysis (59%), and project management (57%).
- **Future skills needs:** Respondents were also asked what skills they would need further training or development in to progress their careers in R&I. Commercial skills were most frequently mentioned (38%), followed by specialist knowledge (37%) and learning to use new technology (37%).
- **High sectoral mobility:** Overall, around half of respondents (48%) had previously worked in different sector/s than those they currently worked in, 50% of those working in private sector businesses and 43% of academics. Those mostly working on Frascati R&D activities were slightly less likely to have experience in a different sector (47%) than those mostly working on other types of R&I (51%).
- **International talent and international mobility:** 14% of respondents were non-British citizens (in line with previous estimates of 15%<sup>4</sup>), and a further 11% held dual citizenship. More than half of respondents (52%) reported having worked outside the UK over the course of their career in R&I, and a further 32% had considered doing so. When asked about their plans for the next five years, 57% said that they might, strongly consider or already have plans to work outside the UK.

---

<sup>4</sup> BEIS (2021a). *Research and development (R&D) pipeline*. From:

<https://www.gov.uk/government/publications/research-and-development-rd-pipeline>



- **Motivations for working in or outside of the UK:** When asked about their reasons for remaining in the UK, respondents mostly cited personal factors such as family reasons (44%), UK culture and lifestyle (40%), or simply being from the UK and not having a good enough reason to move (42%). In contrast, when considering factors that might encourage them to take a R&I role outside the UK, respondents identified better pay and benefits (49%) and a better work-life balance (44%) as the most attractive factors.

The most frequent reasons non-British citizens gave for deciding to stay in the UK so far were: opportunity to work on a particular topic of interest (41%), research facilities/infrastructure (40%) and opportunities for career progression/development (37%), to work with expert colleagues (34%), UK culture/lifestyle (34%), access to research funding (32%) and other personal/family reasons (32%).

Non-British R&I workers were asked to select up to five challenges of living in the UK<sup>5</sup>. The most common answers to this question related to pay and benefits and trying to maintain their standard of living; almost a third (30%) of non-British citizens identified this as something which made it more difficult to work in the UK. This was followed by a quarter (24%) who said that immigration and visa requirements made it more difficult to work in the UK, 15% who answered that finding adequate accommodation was a barrier, 14% who responded that the availability of suitable opportunities to advance their career made it more difficult, and 14% who responded that working hours made it more difficult to work in the UK.

## Research and Innovation Impact

- **Contribution to knowledge:** The survey asked respondents what types of outputs their work had fed into over the last 12 months. The creation of new knowledge was most frequently selected: three-quarters of the R&I workforce overall (75%) reported this as an output from their work. In terms of quantifiable outputs, around half of respondents had contributed to publications in academic journals (54%), including a quarter of private-sector respondents (25%).
- **Commercialisation:** Private sector workers were more likely to report that their work fed into intellectual property and licensing (49% of private sector workers compared with 14% of Higher Education workers), prototypes or new products or processes (48% compared with 10% of Higher Education workers), software and technical products (45% compared with 17% of Higher Education workers), commercialising research or new technology, without seeking intellectual property (37% compared with 10% of Higher Education workers), and a new business, including start-ups and spin-outs (35% compared with 8% of Higher Education workers).
- **Contribution to further R&I:** A similar proportion of the overall workforce had produced data outputs such as datasets or databases (48%). Around half of respondents (51%) had also shared their knowledge via education, training or mentoring: this was

---

<sup>5</sup> Respondents were asked to select the most challenging issues for them from a list provided and could select up to five.

unsurprisingly higher in the education sectors (75% and 73% in Higher Education and Further Education respectively) and lowest in the private sector (33%).

## Working conditions, career incentives and motivations

- **Motivations for choosing R&I careers:** Respondents generally chose their current R&I role due to their interest in the nature of the work. The fact that their job was interesting and meaningful was reported as being very important to respondents when deciding to take up their current role. Three in four respondents (73%) took-up their role because of the 'interesting and meaningful' nature of their current work. The second most important factor for choosing their career (55% of respondents) was a job's purpose and its link with their qualifications, skills, and experience. The location of the job, job security, pay or progression opportunities were on average marked as less important in their career decision.
- **Career length and support:** Two thirds of respondents (64%) had worked in R&I for more than 15 years. The overall average career length to date was 22 years. Most of those who had remained in R&I said that their working environment supported them to do their best work (69% of respondents). However, those who found it unsupportive may have exited the R&I sector.
- **Diversity and Inclusion:** Overall, 75% of the respondents agreed that their workplace culture supports diversity and inclusion and only 8% disagreed. However, respondents from Asian and 'other' ethnic groups were more likely to disagree with the statement compared to white respondents, and women were twice as likely to disagree as men (13% vs. 6%). Private sector respondents (83%) and those with organisational leadership roles (83%) were more likely to agree with this statement.
- **R&I funding:** Nearly 9 out of 10 respondents (87%) reported having applied for UKRI or Innovate UK grant funding for a specific R&I project, including funding from a Research Council, and three-quarters (74%) had received such funding. Applicants and recipients of this funding are likely to be over-represented in our sample due to the use of UKRI and Innovate UK lists as major recruitment channels for the survey. Nevertheless, when asked to suggest in their own words how the UK government could support them in their R&I career, over half of respondents (57%) mentioned some form of further financial support.

## 2. Introduction

### 2.1 Background to the research and objectives

Boosting innovation is one of the government's long-standing priorities. As well as innovation's role in driving productivity and economic growth and raising living standards, it forms a key part of the government's plans for building back from the COVID-19 pandemic<sup>6</sup>. The government has an objective to make the UK a global science superpower, turning world-leading science and ideas into solutions for the public good. The Innovation Strategy<sup>7</sup> built on this with a vision for the UK to be a global hub for innovation. A skilled and productive workforce is crucial for achieving these goals.

As part of the R&D People and Culture Strategy<sup>8</sup>, the government committed to building its understanding of the R&D workforce by, among other things, creating the first annual cross-sector survey of the workforce. The purpose of this survey is to build a robust dataset about the UK R&I workforce. It will be used as a key evidence source for:

- informing policy efforts to meet the objective of making the UK a global science superpower.
- increasing business R&I
- attracting and retaining top R&I talent.

The survey has gathered data on the characteristics of the R&I workforce, the types of work researchers and innovators do, individuals' skills, qualifications and career paths, incentives and motivations in pursuing a career in R&I in the UK, and outputs the workforce produces.

This is the first government survey taking in all sectors of the wider R&I workforce, and to cover a broader span of R&I activities than R&D as usually defined. Although there are existing datasets relevant to the R&D workforce, such as Office for National Statistics (ONS) Business and Enterprise R&D data (BERD), the UK Innovation Survey, UK Research and Innovation (UKRI) grant funding data and Higher Education Statistics Authority (HESA) data, these do not easily allow for cross-sector comparisons, and there are evidence gaps for important policy questions. This survey was designed to enable future data linkage to existing sources, thereby increasing their value.

The results set out in this report provide a snapshot of the 2022 R&I workforce. The Government plans to repeat the survey over future years and for this snapshot to act as a baseline against which future years can be compared. This will help measure the effects of

---

<sup>6</sup> HM Treasury (2021). Op cit.

<sup>7</sup> BEIS (2021b). *UK Innovation Strategy: leading the future by creating it*. From:

<https://www.gov.uk/government/publications/uk-innovation-strategy-leading-the-future-by-creating-it>

<sup>8</sup> BEIS (2021c). *R&D People and Culture Strategy*. From: <https://www.gov.uk/government/publications/research-and-development-rd-people-and-culture-strategy>

R&D and innovation related policies (including global R&I talent attraction and retention policies) and enable better analysis and decision-making for the wider R&D system.

## 2.2 Sample frame

### Considerations when defining eligibility

For this research, we have used a broad definition to capture the UK R&I workforce. This is broader than the definition of R&D workers provided by the OECD's Frascati manual<sup>9</sup>, since the Frascati definition covers only those working on basic research, applied research or experimental development. In addition, this survey also includes workers who are responsible for product or process innovation, or who introduce innovative technologies to their market or organisation. As well as researchers, the survey was open to technicians, engineers, and R&I leaders and managers. Using this broader and pragmatic definition helps to align the findings with general stakeholder and policymaker interests beyond the narrower concept of 'R&D'.

### Approach to defining eligibility

We chose to take an inclusive approach to eligibility. For example, although we have assigned all respondents to one or more Standard Occupational Classification (SOC) codes, we chose not to use these codes to determine eligibility for the survey. This was to avoid incorrectly screening out respondents who perform R&I in occupations outside of a predetermined list, or those who perform R&I but find it difficult to select an appropriate SOC code and might become discouraged by this at the start of the survey. Equally, not every worker in a given SOC code will perform R&I in their role.

We asked potential respondents at the start of the survey to consider whether their role involved R&I. The question asked was as follows:

*"This survey is for people who do any of the following in their work:*

- *generate new knowledge, for example by doing research or scientific studies*
- *apply scientific or technical knowledge to a particular organisation*
- *design, test or develop new or significantly improved products or processes*
- *introduce new technologies to a market*
- *help firms to adopt or apply new technologies*
- *lead or manage teams or projects that do any of the above*

*Does your work involve research or innovation as defined above?*

---

<sup>9</sup> OECD (2015). *Frascati Manual 2015*. From <https://www.oecd.org/innovation/frascati-manual-2015-9789264239012-en.htm>

*If you are not sure, please select “Do not know” and continue. We will collect information about your specific role later on in the survey.”*

All respondents selecting “yes” or “do not know” were able to continue with the survey (1.3% of overall respondents selected “do not know” at this point).

During analysis of the data, we removed a very small number of respondents (9 out of 7,528), who based on their answers to the questions about their occupation and the nature of their work, did not appear to work in research or innovation.

## 2.3 Methodology and recruitment

### Recruitment

Due to the lack of an existing sample frame covering the R&I workforce, the research took the form of an online survey with an open link that could be shared widely. Recruitment took place through a range of channels:

- Email invitations sent to all recipients of UKRI grant funding, containing a unique link to the survey
- Email invitations sent to applicants for Innovate UK funding, containing a unique link to the survey
- Email or postal invitations (including a flyer about the research for workplace noticeboards, and encouragement to circulate the open link among staff) sent to businesses that reported conducting innovation in the UK Innovation Survey; appearing in the “Scientific research and development” sector of the Dun and Bradstreet business database; that were in one of the top ten industry sectors for R&D according to BERD figures<sup>10</sup>; appearing in “most innovative” lists published by the European Commission<sup>11</sup>, PwC<sup>12</sup> and Beauhurst<sup>13</sup>; or that received a Queen’s Award for Innovation.<sup>14</sup>
- Engagement with membership bodies to promote the survey and share the online link, such as R&D specialist organisations, professional societies and industry organisations for industries investing heavily in R&D
- Engagement with relevant think tanks, charities, and trade unions, to promote the survey and share the online link.
- Promotion via social media and other networking opportunities (such as conferences)

If this survey is repeated then the existence of an initial published dataset is likely to stimulate broader stakeholder interest/support over future years, extending the sample size and reach. A

---

<sup>10</sup> ONS, 2021 Business enterprise research and development (BERD)

<sup>11</sup> European Commission, The 2021 EU Industrial R&D Investment Scoreboard

<sup>12</sup> PwC, The Global Innovation 1000 Study

<sup>13</sup> Beauhurst, Most Innovative Companies in the UK 2022

<sup>14</sup> The Gazette. Queen’s Awards for Enterprise press books

press release for traditional media could be considered for future waves as another way of engaging a wide range of respondents.

## Fieldwork

The survey was officially launched on 2nd March 2022 and remained open until 13th May 2022. 7,519 eligible respondents completed the survey. In order to maximise completion rates, we aimed for the survey to take a maximum of 20 minutes to complete, and the average time taken to complete it was 17 minutes.

Further details on methodology, and the full questionnaire, are available in the technical annex to this report.

## 2.4 Analysis and weighting

The research team compared the sample of respondents with existing data sources to understand how representative it was likely to be. In terms of occupation, discipline, gender and region, the survey sample appeared similar to other datasets on the R&D population<sup>15</sup>.

We found that this R&I workforce survey is representative of most occupations considered to be R&I, when comparing against the UK Labour Force. Only 8 out of 23 R&I occupations deviated more than 5 percentage points (comparing this survey to the working population), with ‘Programmers and software development’ workers less represented than they are in the Labour Force, and scientists, Higher Education researchers, R&D managers and chief executives/senior officials showing higher representation when compared with the wider Labour Force. It should be noted that though we define these as ‘R&I occupations’, not every person in a given occupation is expected to undertake R&I activities in their work (for example, not all programmers would innovate). The aim of this R&I workforce survey was to specifically target workers who carry out R&I activities in their roles, so the Labour Force data is not more accurate than this survey for that purpose.

However, comparison with OECD data on the composition of the UK R&D workforce<sup>16</sup> suggests that the sample under-represented workers in private, for-profit organisations, and over-represented workers in other types of organisations. We have therefore weighted the data to correct for this bias, giving more weight to responses from workers in the private sector and

---

<sup>15</sup> To make a decision about weighting, the survey sample was checked against the following datasets: OECD 2019 data on sector breakdowns, Labour Force Survey 2021 data on occupation and gender breakdowns, HESA data on discipline, and BERD 2020 data on employment in R&D for regional breakdowns. Please note that on 26<sup>th</sup> September 2022 ONS announced an error in the coding of occupations in the Labour Force Survey 2021. All the comparisons to the Labour Force Survey that appear in this report therefore use 2020 LFS data.

<sup>16</sup> OECD (n.d.). *R&D personnel by sector and function*. From:

[https://stats.oecd.org/Index.aspx?DataSetCode=PERS\\_FUNC](https://stats.oecd.org/Index.aspx?DataSetCode=PERS_FUNC) Note that OECD private sector workforce numbers are based on BERD 2020 data. Since then, BERD methodology has been updated to better represent small businesses. See <https://www.ons.gov.uk/economy/governmentpublicsectorandtaxes/researchanddevelopmentexpenditure/articles/comparisonofonsbusinessenterpriseresearchanddevelopmentstatisticswithhmrcresearchanddevelopmenttaxcreditstatistics/2022-09-29>

less weight to responses from workers in other types of organisations. Full details of this weighting approach and its effects are given in the technical annex to this report.

The survey also seems to over-represent workers in Small and Medium Enterprises (SMEs; companies with less than 250 staff), particularly in the private sector (27% of all respondents and 48% of private-sector respondents worked in SMEs). 68% of the private sector workers covered in our survey worked in SMEs compared to 61% of the entire R&D workforce defined through relevant SOC codes applied to the Labour Force Survey (LFS) 2020.<sup>17</sup>

Due to the available sample frames for recruitment, 65% of responses received were from the UKRI grant-holder list and a further 18% were from Innovate UK's list of applicants. Analysis of survey data suggests that UKRI grant recipients are more likely than the overall group of respondents to work in Higher Education and have other characteristics associated with this including being employed by an organisation or institution, having higher levels of qualifications, and conducting basic or applied research. Other differences are relatively small, with the exception of outputs: UKRI grant recipients are more likely to report that they have produced outputs including academic and other publications, datasets and databases and policy influence. This may reflect the criteria used to award grants.

Unless otherwise stated, figures given in this report are for the R&I population as a whole, after the weighting described above. The exception to this is where we breakdown results by sectors, where we have used unweighted data. When reporting on sub-groups, we note whether or not results from sub-groups differ from the overall workforce in a statistically significant way<sup>18</sup>, with statistical testing relying on an assumption that the weighted sample achieved was as good as a random probability sample of R&I workers.

---

<sup>17</sup> SOC 2010 codes used: 2011 Chemical scientists; 2112 Biological scientists and biochemists; 2113 Physical scientists; 2114 Social and humanities scientists; 2119 Natural and social science professionals n.e.c.; 2121 Civil engineers; 2122 Mechanical engineers; 2123 Electrical engineers; 2124 Electronics engineers; 2126 Design and development engineers; 2127 Production and process engineers; 2129 Engineering professionals n.e.c.; 2135 IT business analysts, architects and systems designers; 2136 Programmers and software development professionals; 2139 Information technology and telecommunications professionals n.e.c.; 2150 Research and development managers; 2311 Higher education teaching professionals; 2425 Actuaries, economists and statisticians; 2426 Business and related research professionals; 2429 Business, research and administrative professionals n.e.c.; 2461 Quality control and planning engineers; 3111 Laboratory technicians; 3112 Electrical and electronics technicians; 3113 Engineering technicians; 3114 Building and civil engineering technicians; 3115 Quality assurance technicians; 3116 Planning, process and production technicians; 3119 Science, engineering and production technicians n.e.c.

<sup>18</sup> Statistical significance testing is used to determine whether differences in results are likely to be due to a genuine difference between groups, as opposed to chance variation. The threshold used in this research is the 0.05 level, meaning there is less than a 5% chance that results deemed significantly different differ due to chance. This is a standard level of significance used in social sciences.

## 3. Characteristics of the R&I workforce

### 3.1 Employment Status

Table 3.1 shows the employment status of respondents. Almost three quarters (74%) were employees of an organisation or institution, which is less than the UK average of 87%<sup>19</sup>. One in three (29%) were business owners or sole traders, and nearly one in ten (8%) were self-employed (respondents could select multiple options). This relatively high proportion of business owners and sole traders is an expected consequence of using a broader R&I definition than R&D, and points to the ways in which the national R&I effort encompasses a wide range of innovation-enabling activities. It also reflects a self-reported aspect of R&I activity that is unlikely to meet the strict Frascati definitions of activities that do, and do not, constitute formal R&D: of those whose role mostly involved R&I activities outside the formal R&D definition, there was a high proportion of business owners (42%) and those with multiple jobs (12%).

A small number of respondents who were not currently working (n = 23) completed the survey. Among this group, the most often cited reasons for not being in work were limited relevant opportunities to apply for, unsuccessful job applications and sickness or disability.

**Table 3.1: Employment status**

| Employment status  | Per cent |
|--|----------|
| I am employed by an organisation or institution                      | 74%      |
| I am a business owner or sole trader                                 | 29%      |
| I currently have multiple jobs                                       | 8%       |
| I am self-employed   | 8%       |
| I am doing research as part of a qualification (such as a doctorate) | 1%       |
| I am unemployed, retired or otherwise not in paid work               | <1%      |
| Retired - still working / active in research / publishing            | <1%      |
| I am on an apprenticeship  | <1%      |
| Other / do not know / prefer not to say                              | 1%       |

*Base: all respondents (7,519). Respondents could select multiple options.*

#### Employment status by sector

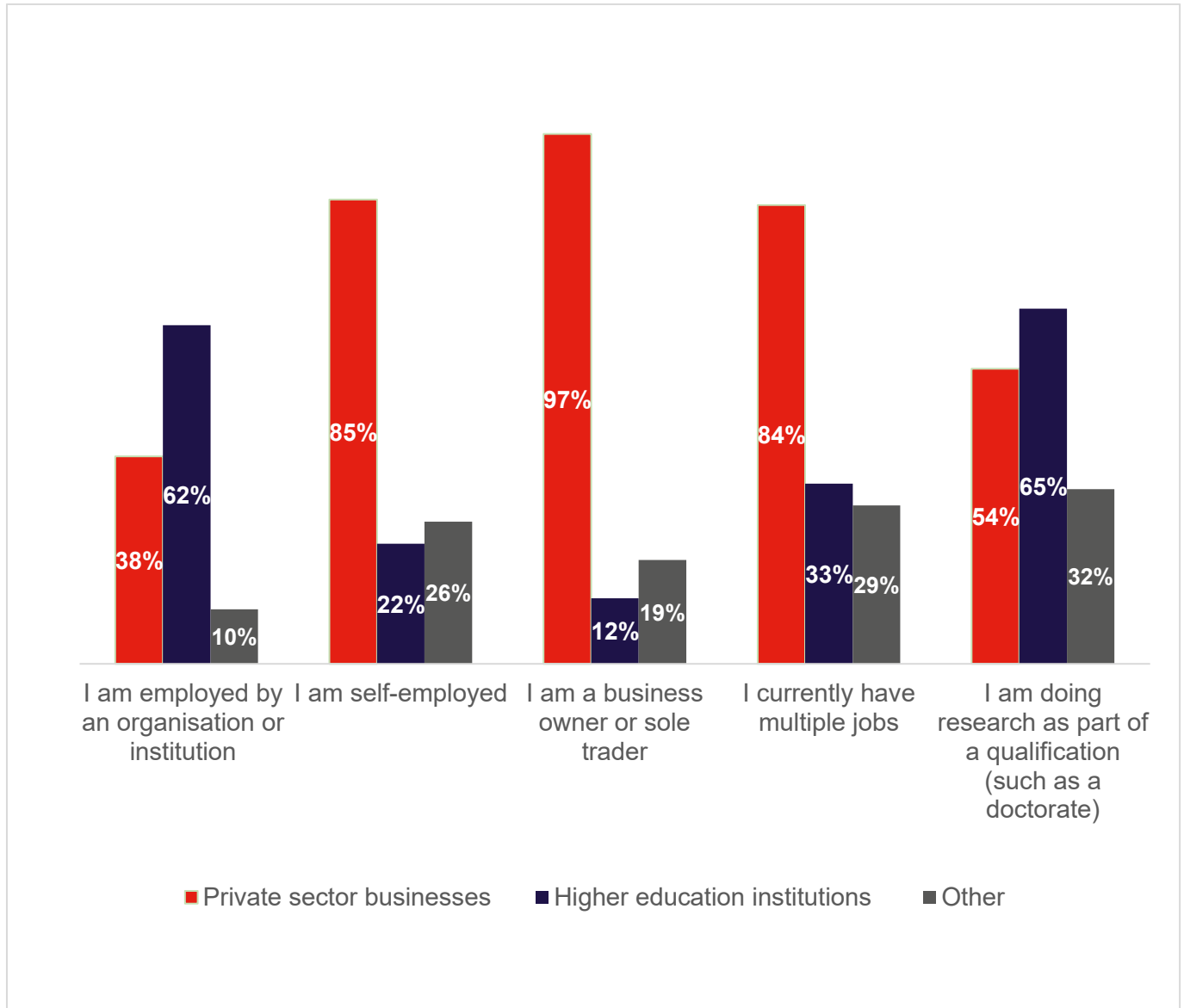
Figure 3.1 shows which sectors respondents work in, by their different employment status. It shows that most of those reporting being employed by an organisation or institution are located

<sup>19</sup> ONS (2022). A01: Summary of labour market statistics. From: <https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/datasets/summaryoflabourmarketstatistics>



in Higher Education institutions, whereas the self-employed and business owners are much more likely to be working in the private sector. There are, however, some incidences of self-employed respondents working in Higher Education institutions.

**Figure 3.1: Current sector of employment by type of work undertaken**



Base: Employees (6512), self-employed (373), business owners (1048), multiple jobs (421), doing research as part of qualification (76).

Respondents could select multiple options, so bars do not sum to 100%.

### Employment status by demographics

Men were less likely to be employed by an organisation or institution compared with women (70% versus 82%) and were more likely to report being business owners or sole traders (34% versus 18%). People from the White and Other ethnic groups were more likely to be employees than respondents from Black, Asian or Mixed ethnic groups, which may reflect that respondents in the White and Other ethnic groups were more likely to be employed by a Higher Education institution specifically. Those from the Black/Black British ethnic group were more likely to be business owners, sole traders or self-employed. However, the number of

observations is relatively small for some groups and so findings should be interpreted with caution.

Older respondents were more likely to be business owners or sole traders. The percentage increases with age: 19% of those under 35 reported being business owners/sole traders compared with 33% of those aged 55-64.

## Employment status by qualification

In general, the higher the level of qualification, the more likely that someone in the R&I workforce will report being employed by an institution or organisation. For those with doctorates, 89% reported being an employee compared with 56% of those whose highest qualification was a master or undergraduate degree. Those with doctorates were less likely to be either business owners / sole traders or self-employed compared with their counterparts with lower levels of attainment. This is related to the finding that a high proportion of respondents with doctorates (around 74%) work in Higher Education institutions.

## 3.2 Sector

R&I as an activity is undertaken across a wide range of organisations. In some, R&I is the principal activity (such as in research and development organisations). In others it might be one of many activities an organisation undertakes.

According to OECD figures<sup>20</sup>, around 52% of the UK's R&D workforce is in the private sector, with 45% in academia, 2% in government/the public sector and 1% in not-for-profit organisations. In comparison, our unweighted survey sample was 22% private sector, 66% academia, 10% government/public sector and 2% in not-for-profit organisations. As described in section 2.4, our survey data has been weighted to better reflect the true proportions of the workforce in each sector as given by the OECD data.

The survey also asked respondents to report the sectors in which they had previously worked, and this is discussed in section 4.4 below.

The results show widespread collaboration across sectors: less than 0.5% of respondents reported that they did not collaborate with organisations in any sector, and 81% of respondents reported collaborating with sectors other than the one they worked in in their current role.

We can also look at collaboration by occupation. Research and development managers were the most likely occupation to report collaborating with a sector that they did not work in (with 89% reporting that they had done so in their current role), followed by social and humanities scientists (88%) and health professionals (87%). Over two-thirds (68%) of those currently employed in the private sector collaborate with Higher Education institutions, and 46% with public sector research organisations in their current role. Similarly, 61% of respondents working in Higher Education collaborate with private sector organisations, 49% with public

---

<sup>20</sup> OECD (n.d). op cit

sector research organisations, and 52% with not-for-profit organisations. About 81% and 62% of business owners collaborate with other private sector businesses and Higher Education institutions, respectively. This is much higher than the 22% of innovative firms reporting working with government or public research institutes, and 23% with universities or other Higher Education institutions in the most recent UK innovation survey<sup>21</sup>.

There is appetite for further collaboration: when asked to suggest ways in which government could support their career, 1135 respondents suggested initiatives to promote collaboration.

68% of the private sector workers covered in our survey worked in SMEs compared to 61% of the entire R&D workforce defined through relevant SOC codes applied to the Labour Force Survey (LFS) 2020.<sup>22</sup>

**Table 3.2: Size of organisation employing private-sector respondents**

| Number of people working at organisation | Per cent    |
|--|-------------|
| 1 to 9 (micro business)                  | 26%         |
| 10 to 49 (small business)                | 27%         |
| 50 to 249 (medium business)              | 15%         |
| 250 to 499 (large business)              | 3%          |
| 500 or more (large business)             | 28%         |
| <b>Total</b>                             | <b>100%</b> |

*Base: all employees working primarily in the private sector (968). Does not include business owners or sole traders unless they were also employees of an organisation.*

Those working in not-for-profit organisations were more likely to work for large organisations (i.e., employing more than 249 people). Whilst one third (32%) of private sector respondents worked in large organisations, more than half (57%) of not-for-profit sector respondents did so. Around 70% of Higher Education and 56% of public sector R&I staff worked in large organisations.

The levels of educational attainment varied by sector (see Table 3.2). Those working in Higher Education Institutions were the most likely to hold doctorates (91%). Those who spent most of

<sup>21</sup> BEIS (2021b). *UK Innovation Survey*. From: <https://www.gov.uk/government/statistics/uk-innovation-survey-2021-report>

<sup>22</sup> SOC 2010 codes used: 2011 Chemical scientists; 2112 Biological scientists and biochemists; 2113 Physical scientists; 2114 Social and humanities scientists; 2119 Natural and social science professionals n.e.c.; 2121 Civil engineers; 2122 Mechanical engineers; 2123 Electrical engineers; 2124 Electronics engineers; 2126 Design and development engineers; 2127 Production and process engineers; 2129 Engineering professionals n.e.c.; 2135 IT business analysts, architects and systems designers; 2136 Programmers and software development professionals; 2139 Information technology and telecommunications professionals n.e.c.; 2150 Research and development managers; 2311 Higher education teaching professionals; 2425 Actuaries, economists and statisticians; 2426 Business and related research professionals; 2429 Business, research and administrative professionals n.e.c.; 2461 Quality control and planning engineers; 3111 Laboratory technicians; 3112 Electrical and electronics technicians; 3113 Engineering technicians; 3114 Building and civil engineering technicians; 3115 Quality assurance technicians; 3116 Planning, process and production technicians; 3119 Science, engineering and production technicians n.e.c.

their working time on non-Frascati R&I activities were more likely to hold a higher-level apprenticeship (8%) or to have no qualifications (6%) compared to the sample overall.

**Table 3.3: Employment by sector and highest qualification<sup>23</sup>**

| Highest educational attainment       | Employment sector         |                 |             |                                      |      |                              |                     |                          |
|--------------------------------------|---------------------------|-----------------|-------------|--------------------------------------|------|------------------------------|---------------------|--------------------------|
|                                      | Private sector businesses | HE institutions | FE colleges | Public sector research organisations | NHS  | Local or national government | Other public sector | Non-profit organisations |
| Doctorate                            | 34%                       | 91%             | 43%         | 70%                                  | 70%  | 35%                          | 34%                 | 53%                      |
| Master's / other postgrad            | 27%                       | 5%              | 29%         | 16%                                  | 16%  | 35%                          | 33%                 | 26%                      |
| Undergrad degree                     | 22%                       | 2%              | 14%         | 8%                                   | 6%   | 21%                          | 18%                 | 11%                      |
| Qualification below undergrad degree | 10%                       | 1%              | 8%          | 3%                                   | 5%   | 5%                           | 10%                 | 6%                       |
| No qualifications (of those listed)  | 7%                        | 1%              | 6%          | 2%                                   | 3%   | 3%                           | 5%                  | 3%                       |
| Total                                | 100%                      | 100%            | 100%        | 100%                                 | 100% | 100%                         | 100%                | 100%                     |

Base: all respondents (7,519). Data are not weighted.

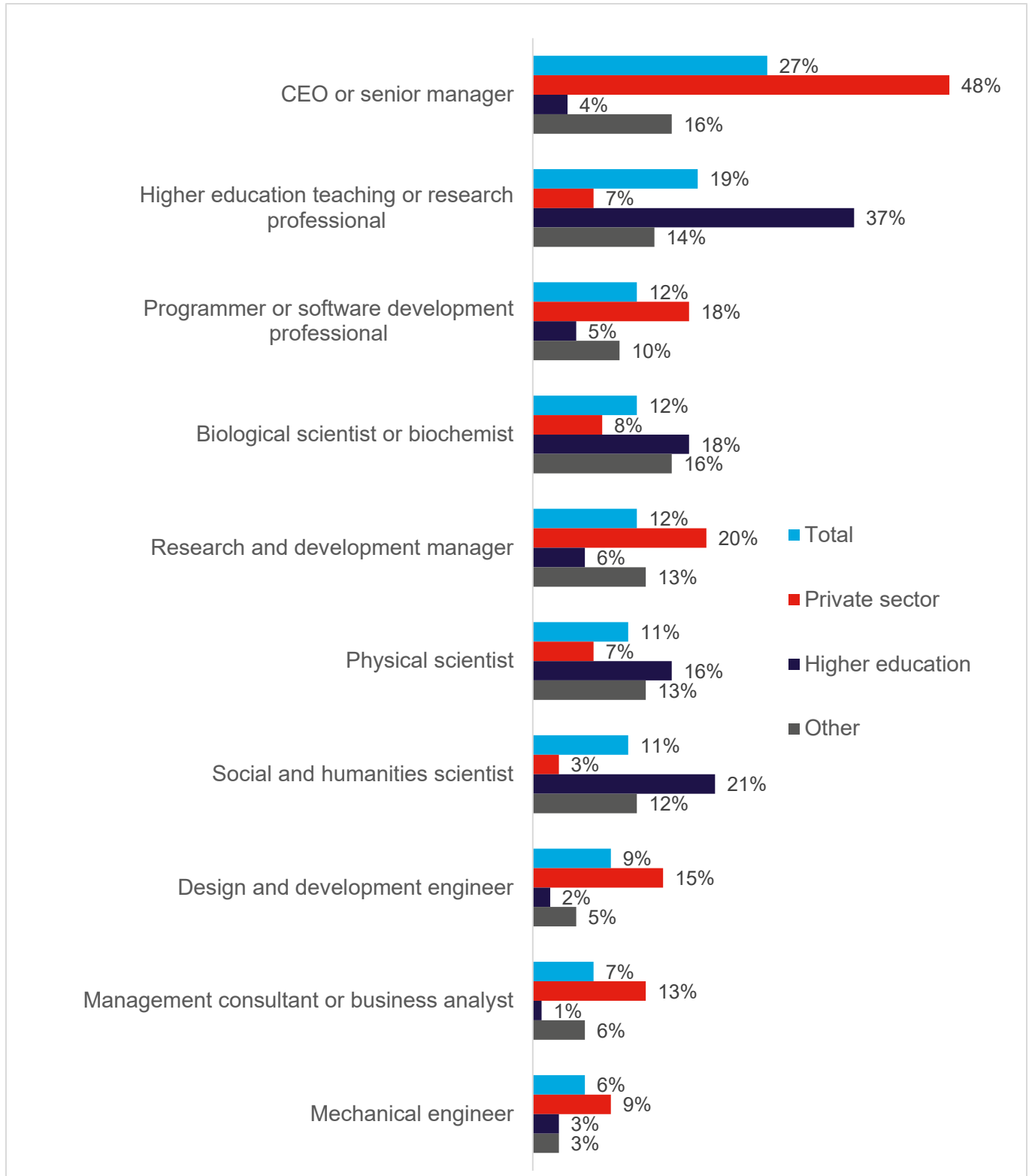
### 3.3 Occupation

Occupation provides an indication of the type of work in which individuals are involved. As a concept, occupation is designed to group together people who are undertaking common tasks in terms of the level and type of the skills required. Figure 3.2 presents the occupation spread of respondents. The most frequently mentioned roles were CEO or senior manager (27% overall and 48% of private-sector respondents), and Higher Education teaching or research professional (19%, and 37% of higher education respondents). Research and development

<sup>23</sup> Because these figures have been rounded to the nearest whole number, employment sectors may not total exactly 100%

manager, biological scientist or biochemist, and programmer or software development professional were mentioned by 12% of respondents.

**Figure 3.2: Occupational distribution of employment in R&I of 10 most frequent occupations**



Base: All respondents (7,519) Private sector 1,793; Higher Education 5,130; Others 1,379. Total %s are weighted, individual sector %s are not. Respondents could select multiple options.

Men were more likely to say that they worked as a CEO or senior manager (30% compared to 19% for women) and women were more likely to describe their role as being Higher Education teacher or research professional (24% compared with 17%). The largest gender differences occur in engineering occupations: electronics, mechanical and design and development engineering roles are all 90% or more male.

There is little variation by ethnic group or by age. Older respondents (those aged 45+) are more likely to report being in a CEO or senior manager role than younger respondents, but the age distribution of the other main occupations is similar. See Table 7.9 in the Annex for a full occupational and socio-demographic characteristics of the R&I workforce.

To build a more detailed picture of the types of jobs in which respondents worked, respondents who were employed by an organisation or institution were asked about their responsibilities within their current job (see Table 3.4). More than 9 out of 10 (92%) reported being in a position of responsibility within their organisation. Just under half (45%) were team or project leaders and one quarter led a department or division. While the percentage with no leadership responsibilities was the same in private sector organisations and Higher Education institutions (7%), respondents working in the former were more likely to lead the entire organisation (36%). Those working in Higher Education were more likely to be team or project leaders (60%). Men were almost 3 times as likely as women to lead an organisation (19% compared to 7%). Older respondents were more likely to be leaders of organisations, departments or divisions.

**Table 3.4: Responsibilities of those working in R&I jobs**

| Employment status                                  | Per cent    |
|--|-------------|
| Lead the entire organisation                       | 15%         |
| Lead a department or division in your organisation | 25%         |
| Lead a team or projects involving other people     | 45%         |
| Supervise colleagues or contractors                | 7%          |
| None of the above                                  | 7%          |
| <b>Total</b>                                       | <b>100%</b> |

*Base: all respondents (7,519).*

## 3.4 What type of work do R&I workers do?

### Types of R&I activity undertaken

The preceding discussion has used occupational titles to indicate the type of work respondents undertake. The survey also explored the types of R&I activities carried out by those working in R&I. This serves to develop a more detailed picture of the types of activity and associated skills required to work in R&I (skills are discussed further in section 4.1).

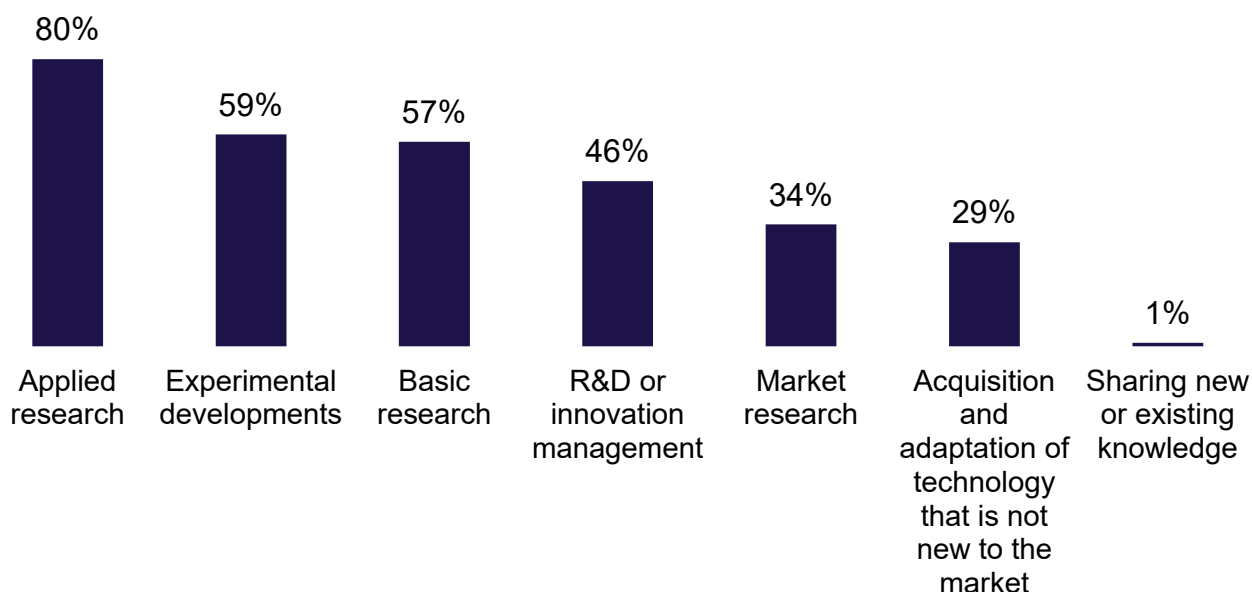
The survey asked respondents about which types of R&I activity they had done in their job role, and of these, which one took up the greatest share of their working time<sup>24</sup>. Four in 5 respondents (80%) reported that their work included an element of applied research. The next most commonly selected types of R&I activity were experimental development (forming part of the job role for 59% of the R&I workforce surveyed) and basic research (57%). Altogether, 95% of the R&I workforce carried out at least one of these core R&D activities in their job role.

However, a significant proportion of the R&I workforce surveyed (60%) spend some of their working time on R&I activities beyond the Frascati definition of R&D, and for 25% of our respondents, these activities took up the majority of their working time. Nearly half of the R&I workforce surveyed (46%) carried out work relating to R&D or innovation management (establishing strategies, processes, structures and responsibilities to increase research or innovation and its usage) and one-third engaged in market research of potential users, marketing or competitors. Three in ten (29%) had a role which included acquisition and adaptation of technology that is not new to the market but new to their organisation, showing that R&I workers have a significant role in wider technology adoption and diffusion.

---

<sup>24</sup> These were defined in the questionnaire as: basic research (work to acquire new knowledge without a specific application); applied research; experimental development; market research of potential users; marketing or competitors; acquisition and adaptation of technology that is not new to the market but is new to your organisation; R&D or innovation management; and other research or innovation activities, which respondents were asked to specify.

**Figure 3.3: Types of activities in which the R&I workforce are engaged**



*Base: All respondents (7,519). Respondents could select multiple options*

The range of activities carried out varied substantially by sector of employment. Higher Education research staff tended to focus on R&D that meets the ‘Frascati definition’: applied research (with 83% of those in HE reporting that their role involved this), basic research (77%), and experimental research (42%). While most of those working in the private sector (80%) had also undertaken applied research, these workers were also likely to have undertaken experimental research (76%), R&D or innovation management (66%), market research (57%), and the acquisition and adaptation of new technology (43%).

Table 3.5 shows the proportion of respondents undertaking each type of research activity working in a given sector. Many respondents undertook several activity types, so the groups are not mutually exclusive. As would be expected, more of those engaged in basic research reported working in Higher Education institutions compared with the private sector (65% versus 36%). Those working in applied research were more or less evenly split between the private sector and Higher Education institutions.

All other R&I activities were more likely to be reported by private sector respondents:

- experimental development
- market research
- acquisition and adaptation of technology new to your organisation; and
- R&D or innovation management

We also grouped respondents whose roles mainly consisted of one or a combination of the three Frascati-defined R&D activities, and respondents whose roles mainly consisted of



another type of R&I activity outside the Frascati definition<sup>25</sup>. The table below presents how respondents working on each type of R&I activity are distributed across sectors. Of the group working mainly on non-Frascati R&I activities, 4 out of 5 (80%) worked in the private sector.

**Table 3.5: Sector breakdown of respondents undertaking each type of R&I activity**

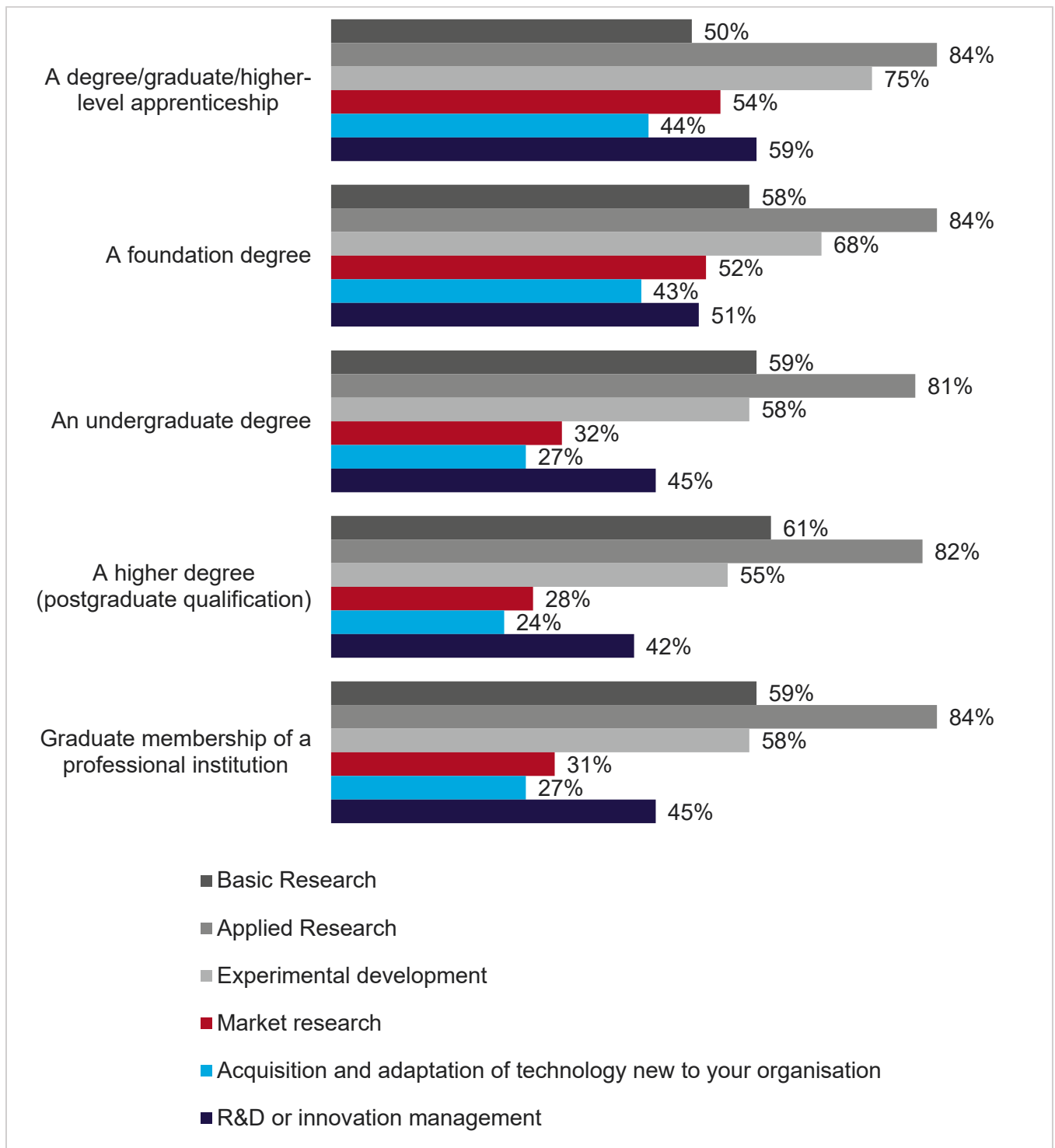
| Sector                              | Mainly Frascati R&D | Basic research | Applied research | Experimental development | Mainly non-Frascati R&D | Market research | Acquisition and adaptation of technology new to | R&D or innovation management |
|-------------------------------------|---------------------|----------------|------------------|--------------------------|-------------------------|-----------------|---|------------------------------|
| Private sector                      | <b>42%</b>          | 36%            | 51%              | 67%                      | <b>80%</b>              | 88%             | 80%   | 75%                          |
| Higher Education                    | <b>59%</b>          | 65%            | 50%              | 36%                      | <b>22%</b>              | 16%             | 23%   | 29%                          |
| Further Education                   | <b>1%</b>           | 1%             | 1%               | 1%                       | <b>1%</b>               | 2%              | 1%  | 2%                           |
| Public sector research organisation | <b>4%</b>           | 5%             | 5%               | 5%                       | <b>4%</b>               | 5%              | 6%  | 6%                           |
| NHS                                 | <b>2%</b>           | 2%             | 2%               | 2%                       | <b>2%</b>               | 2%              | 3%  | 3%                           |
| Local or national government        | <b>3%</b>           | 3%             | 3%               | 3%                       | <b>4%</b>               | 4%              | 4%  | 4%                           |
| Other public sector                 | <b>1%</b>           | 2%             | 2%               | 2%                       | <b>2%</b>               | 3%              | 3%  | 2%                           |
| Non-profit                          | <b>5%</b>           | 5%             | 5%               | 6%                       | <b>7%</b>               | 8%              | 7%  | 6%                           |

*Respondents could be working in multiple sectors and therefore columns sum to more than 100%.*

Figure 3.4 shows the types of activity undertaken by respondents with different qualification levels. Respondents with postgraduate qualifications or graduate membership of a professional institution were more likely to report undertaking basic research, whereas those with apprenticeships or none of the listed qualifications were more likely to be undertaking R&I activities beyond the Frascati definitions, such as R&D and innovation management, market research, and introducing new technology to their organisations.

<sup>25</sup> These two groups are mutually exclusive. It was not possible to assign every respondent to one of these two categories, as some were unable to say which activity type took up most of their time.

**Figure 3.4: Type of research activity undertaken by each qualification level**

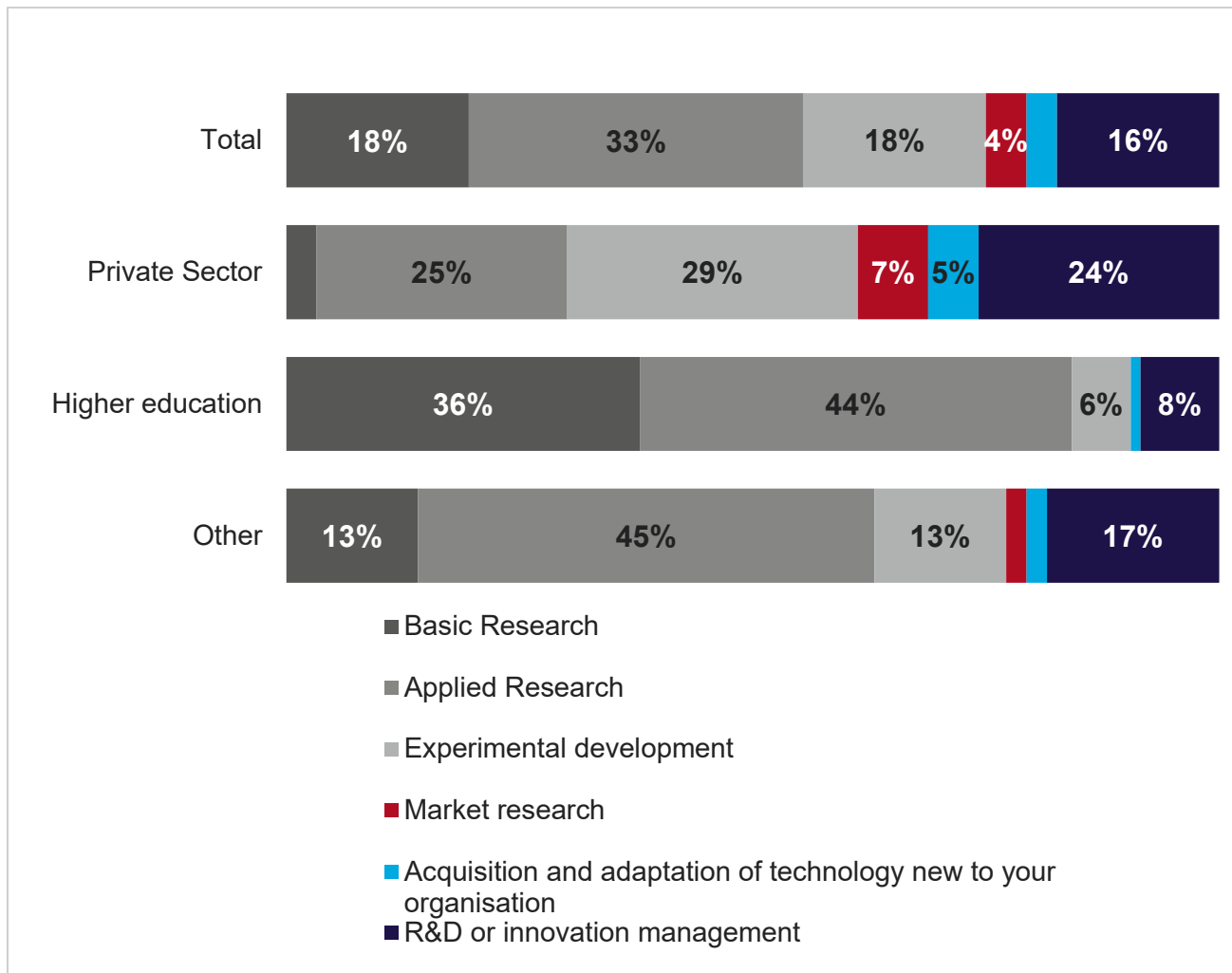


Base: Respondents with the relevant qualifications. Higher-level apprenticeships 450; foundation degrees 190; undergraduate degrees 5,060; higher degrees 5,710; graduate memberships 2,789. Respondents could select multiple options.

When asked to select the type of R&I activity that had taken up the greatest share of their working time in the last 6 months, two-thirds of respondents identified 1 of the 3 Frascati R&D activities: 33% selected applied research, with 18% selecting basic research and a further 18% selecting experimental development. One-quarter of respondents (25%) reported that the

biggest share of their working time was spent on non-Frascati R&I activities, most commonly R&D or innovation management.

**Figure 3.5: Type of research activity taking up greatest share of working time**



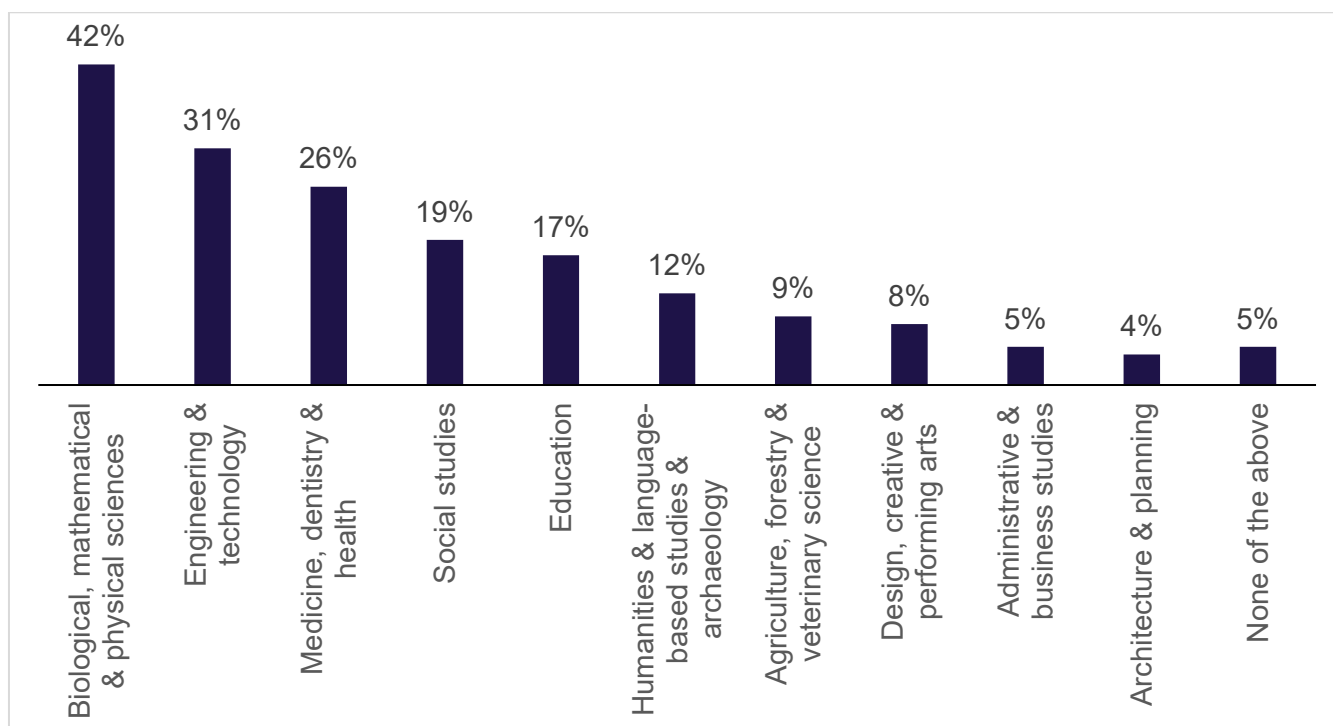
Base: All respondents (7,519). Private sector 1,793; Higher Education 5,130; Others 1,379. Total %s are weighted, individual sector %s are not.

Those in Higher Education were more likely to have focused on applied and basic research, whilst private sector respondents were more likely to report their main activities were experimental development, or research or innovation management. Those working in social science and humanities, and Higher Education teaching or research professionals were more likely to have recently been involved in applied research; biological scientists, biochemists and physical scientists tended to focus on applied and basic research; whilst programmers or software development professionals had mostly worked on applied and experimental research. Research and development managers, CEOs or senior managers, and those with organisational leadership responsibilities tended to report a wider range of activities such as applied research, experimental development, and R&D or innovation management. A full breakdown of the types of R&I activities each occupation reported working on is provided in Table 7.3 in the annex. This insight into how workers in each SOC code spend their time will augment the use of the Labour Force Survey for future analysis.

## Academic disciplines and industry groups

Respondents from academia, the public sector and not-for-profit organisations were asked to select the discipline(s) in which they worked. The most common were: biological, mathematical & physical sciences (42%); engineering & technology (31%); medicine, dentistry & health (26%); social studies (19%); and education (17%). From a sectoral perspective, those in this group who reported also working in the private sector were much more likely to be working in engineering & technology (60% compared to 27% of this group overall), but less likely to be working in the biological, mathematical & physical sciences (30% compared with 44% of this group overall).

**Figure 3.6: Disciplines in which R&I personnel work**



*Base: All academics, public and/or non-profit researchers (4,079) Respondents could select multiple options.*

Meanwhile, private sector respondents were asked which industry groups best describe the R&I activities they are involved in. Software development was most frequently mentioned (36%), indicating the relative importance of digitalisation within R&I. This was followed by research and development services (30%); computer programming and information service activities (21%<sup>26</sup>); and healthcare (20%). Beyond this, the data reveals a wide range of industry groups in which R&I takes place. Around one in ten private sector workers were involved in: machinery and equipment; miscellaneous business activities/technical testing and analysis; pharmaceuticals; aerospace; construction; chemicals and chemical products; electrical equipment; or food products and beverages/tobacco products.

<sup>26</sup> Respondents could select more than one option and so there is overlap between groups. 40% of private-sector respondents worked in one or both of the software development and computer programming and information service activities.

## Work on globally competitive technologies

The government's innovation strategy<sup>27</sup> recently set out 7 families of technologies in which the UK is globally competitive<sup>28</sup>:

- Advanced Materials and Manufacturing
- AI, Digital and Advanced Computing
- Bioinformatics and Genomics
- Engineering Biology
- Electronics, Photonics and Quantum
- Energy and Environment Technologies
- Robotics and Smart Machines

The purpose of identifying these technology families is to focus domestic and international attention on the potential of UK technology and to encourage collaboration between industry, researchers, and government to strengthen the broader technological ecosystem.

Respondents were asked if their work related to any of these seven key technology families. The pattern of employment status appears to vary when comparing groups working on each of these technologies. Around 2 in 5 of those working on robotics and AI, digital and advanced computing reported being a business owner/sole trader. This points to a key role for start-ups in R&I in these areas.

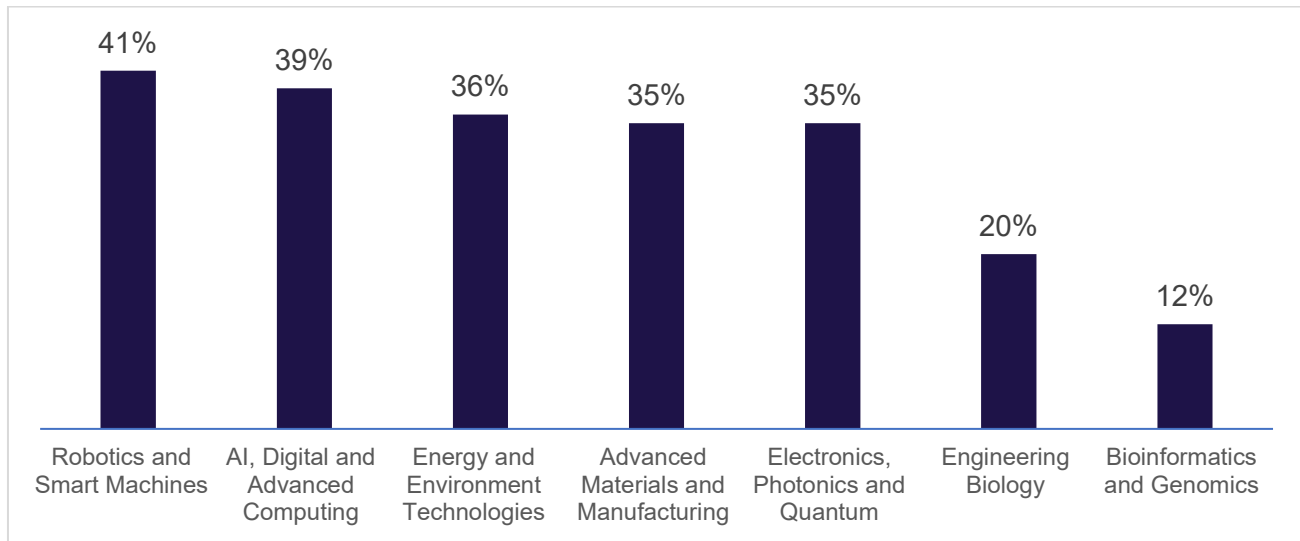
Figure 3.7 shows the proportion of those working on each of these technology families that were business owner or sole traders. Figure 3.8 shows the proportion of all respondents that reported working on each of these technology families.

---

<sup>27</sup> BEIS (2021b). Op cit.

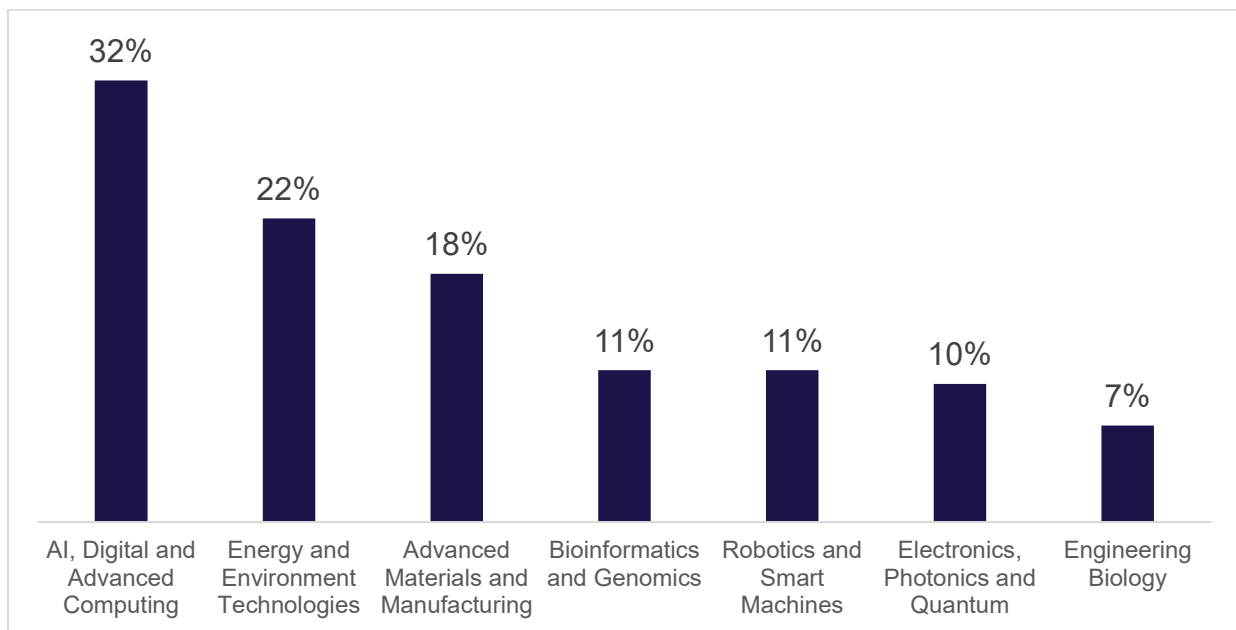
<sup>28</sup> The families are derived from an analytical synthesis drawing on work from BEIS, UK Research and Innovation including Innovate UK, and the Intellectual Property Office.

**Figure 3.7: Proportion of those working on each technology family that are business owners/sole traders**



Base: All respondents working on Robotics and Smart Machines (637), AI, Digital and Advanced Computing (2125), Energy and Environment Technologies (1444), Advanced Materials and Manufacturing (1101), Electronics, Photonics and Quantum (675), Engineering Biology (578) and Bioinformatics and Genomics (1033). Respondents could select multiple options

**Figure 3.8: Proportion of the R&I Workforce working on each technology family**



Base: all respondents (7,519). Respondents could select multiple options

Around two-thirds (64%) of the surveyed workforce reported that their work related to at least one of these seven technologies. AI, Digital and Advanced Computing was the technology family most commonly identified as relevant to their role, selected by one-third of the R&I workforce surveyed (32%), followed by Energy and Environment technologies (22%) and Advanced Materials and Manufacturing (18%).

Table 3.6 details, for each sector, the proportion of respondents whose work related to each of the technology families. Private sector respondents were much more likely to say their work related to one of the 7 technologies listed (76%) compared to those in Higher Education (56%). Energy and Environment Technologies were more prevalent in Further Education colleges (37%), as well as private sector businesses and public sector research organisations (both 27%), whereas Bioinformatics and Genomics was most likely to be worked on in the NHS (34%), public sector research organisations (23%) and Higher Education institutions (15%); and Robotics and Smart Machines were most likely to be worked on in Further Education colleges (24%), private sector businesses (15%), and non-profit organisations (13%).

**Table 3.6: Whether work relates to any of the 7 technology families**

|                                      | All (weighted) | Private sector businesses | Higher Education institutions | Further education colleges | Public sector research organisations | National Health Service | Local or national government | Other public sector | Non-profit |
|--------------------------------------|----------------|---------------------------|-------------------------------|----------------------------|--------------------------------------|-------------------------|------------------------------|---------------------|------------|
| AI, Digital and Advanced Computing   | <b>32%</b>     | 40%                       | 25%                           | 45%                        | 37%                                  | 33%                     | 34%                          | 24%                 | 32%        |
| Energy and Environment Technologies  | <b>22%</b>     | 27%                       | 16%                           | 37%                        | 27%                                  | 4%                      | 26%                          | 26%                 | 22%        |
| Advanced Materials and Manufacturing | <b>18%</b>     | 23%                       | 13%                           | 27%                        | 18%                                  | 5%                      | 13%                          | 14%                 | 12%        |
| Bioinformatics and Genomics          | <b>11%</b>     | 7%                        | 15%                           | 18%                        | 23%                                  | 34%                     | 8%                           | 7%                  | 14%        |
| Robotics and Smart Machines          | <b>11%</b>     | 15%                       | 7%                            | 24%                        | 12%                                  | 8%                      | 12%                          | 9%                  | 13%        |
| Electronics, Photonics and Quantum   | <b>10%</b>     | 13%                       | 8%                            | 14%                        | 14%                                  | 3%                      | 7%                           | 3%                  | 7%         |
| Engineering Biology                  | <b>7%</b>      | 7%                        | 9%                            | 10%                        | 9%                                   | 7%                      | 5%                           | 3%                  | 4%         |
| None of the above                    | <b>34%</b>     | 24%                       | 44%                           | 24%                        | 28%                                  | 41%                     | 45%                          | 45%                 | 43%        |

Base: all respondents (7,519). Data are not weighted except for "All" column.



Men were more likely to be doing work related to one of these technology families: 70% of men reported that their work related to one of these technologies compared to 50% of women. This pattern was repeated across the individual technology families, with a higher proportion of men than women working in each one, with the exception of Bioinformatics and Genomics where there was no difference.

### 3.5 Region

The survey found that the R&I workforce is disproportionately concentrated in the south-east corner of England. In total, 44% of the R&I workforce is located in London, the South East, and East of England<sup>29</sup>, compared with 38% of the UK workforce overall. Table 3.7 shows that 1 in 5 respondents had a work location in London (19%), 15% in the South East (excluding London), one in ten in Scotland and the same percentage in the East of England. The geography of work location is similar by sector and gender. Asian/Asian British respondents and younger respondents (under 35) were more likely to be working in London.<sup>30</sup> As this survey did not have a sample frame that represents all R&I workers in the UK, the regional breakdowns should be used with caution, although they closely match the regional breakdown of R&D occupations from the Labour Force Survey. Table 3.7 highlights this by comparing other estimates for the regional R&I workforce.

**Table 3.7: Location of workplace**

| Location                 | This R&I workforce survey | UK workforce in R&D occupations (LFS 2020) | Entire UK workforce (LFS 2021) <sup>31</sup> | Higher Education staff (HESA 2020/21) |
|--------------------------|---------------------------|--|--|---------------------------------------|
| North East               | 4%                        | 3%   | 4%   | 4%                                    |
| North West               | 7%                        | 9%   | 11%  | 9%                                    |
| Yorkshire and The Humber | 8%                        | 7%   | 8%   | 7%                                    |
| East Midlands            | 6%                        | 6%   | 7%   | 6%                                    |
| West Midlands            | 6%                        | 7%   | 9%   | 7%                                    |
| East of England          | 10%                       | 9%   | 10%  | 6%                                    |
| London                   | 19%                       | 18%  | 15%  | 22%                                   |
| South East               | 15%                       | 16%  | 14%  | 14%                                   |
| South West               | 9%                        | 8%   | 8%   | 7%                                    |

<sup>29</sup> This grouping of regions is referred to in the 2022 Levelling Up White Paper (<https://www.gov.uk/government/publications/levelling-up-the-united-kingdom>) as the “Greater South East”, and the paper makes a specific commitment to increasing R&D funding outside this area.

<sup>30</sup> This finding is consistent with ethnicity and age patterns in the overall UK workforce (Labour Force Survey 2020)

<sup>31</sup> LFS 2021 figures were used for the entire workforce as those are the latest figures available at the time of the publication of this report. Miscoding of SOC occupations in 2021 LFS did not impact workforce-level figures.

|                  |     |     |     |     |
|------------------|-----|-----|-----|-----|
| England          | 84% | 85% | 85% | 83% |
| Scotland         | 10% | 8%  | 8%  | 11% |
| Wales            | 3%  | 5%  | 4%  | 4%  |
| Northern Ireland | 1%  | 2%  | 3%  | 2%  |

Source: R&I Workforce Survey 2022 / Labour Force Survey 2022

Respondents were also asked where they lived. The regional distribution of where R&I workers live is similar to that of work location, and 67% of respondents reported working and living in the same region. This was highest in the North East, where 78% of respondents living in that region also worked there, and lowest in the South East, where the equivalent figure was 57%. Slightly more respondents worked in London than lived there (4 percentage points more) and more respondents lived in the South East than worked there (3 percentage points more).

On average, respondents lived roughly 15 miles away from their place of work<sup>32</sup>. This is further than the average distance to work for the overall England and Wales workforce, which is 9 miles (although data on this is from 2011). Respondents in the North East lived closest to their work on average (9.2 miles away) whereas respondents in the South West tended to live furthest away (19.3 miles). Private sector respondents tended to live further away from their workplace on average (19.5 miles) compared to respondents in Higher Education (13.9 miles).

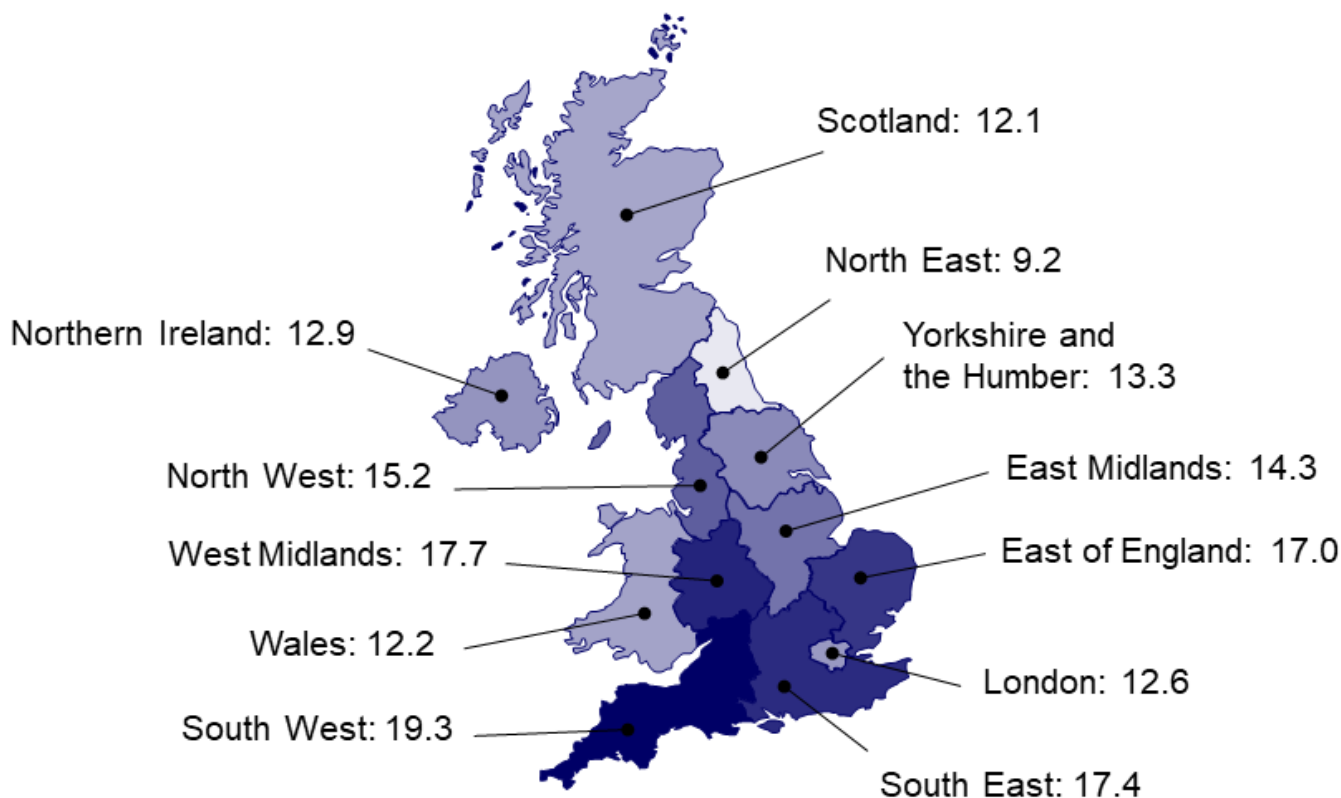
**Table 3.8: Average distance between workplace and home for R&I workers**

| Location                 | Average distance to R&I work (miles) | Overall workforce (2011) |
|--------------------------|--------------------------------------|--------------------------|
| North East               | 9.2                                  | 7.3                      |
| North West               | 15.2                                 | 7.6                      |
| Yorkshire and The Humber | 13.3                                 | 7.9                      |
| East Midlands            | 14.3                                 | 7.9                      |
| West Midlands            | 17.7                                 | 8.1                      |
| East of England          | 17.0                                 | 9.6                      |
| London                   | 12.6                                 | 11.0                     |
| South East               | 17.4                                 | 9.8                      |
| South West               | 19.3                                 | 9.5                      |
| Scotland                 | 12.1                                 | not available            |
| Wales                    | 12.2                                 | 8.2                      |
| Northern Ireland         | 12.9                                 | not available            |

Source: R&I Workforce Survey and 2011 census data. Base: 5,105 respondents who provided valid postcode data for both questions.

<sup>32</sup> This was calculated based on the first part of respondents' home and work postcodes.

**Figure 3.9: Average distance between workplace and home in miles**



Base: 5,105 respondents who provided valid postcode data for both questions.

### The R&I workforce in the context of the levelling up agenda

The UK Research and Development Roadmap (released in July 2020) set out the government's goals to further boost science, research and innovation. This roadmap draws attention to the importance of R&D for levelling up left-behind regions in the UK, since it is well-known that R&D and innovation has a positive impact on productivity.

The Research and Innovation Workforce Survey reveals that the R&I workforce is disproportionately concentrated in the south east corner of England. The data show that 44% of respondents had a work location in the Greater South East (London, the South East and East of England), whilst the North East of England, Wales, and Northern Ireland contained only 8% of the R&I workforce combined. These figures are similar to those found in the LFS 2020, which reports that 43% of R&D employment is in the Greater South East. The geography of residence reveals a similar picture, since on average R&I workers surveyed live 15 miles away from their workplace; around 95% of respondents who live in the Greater South East also reported working there.

The Levelling Up White Paper included this mission: "By 2030, domestic public investment in R&D outside the Greater South East will increase by at least 40%". This will require regions and nations to develop and attract a workforce with the skills needed for innovation. Innovation is part of an interconnected system where talented people and teams work in a supportive and diverse culture across multiple sectors, with adequate

access to resources such as funding, infrastructure and data. For investments to have the expected impact, it is important to know which elements of the system are not sufficiently in place in the regions.

The Research and Innovation Workforce Survey sheds light on this by detailing the characteristics of the R&I workforce, skills needs and obstacles to working in the UK. For example, half of Information Technology (IT) directors and CEOs or senior managers are working in the Greater South East, whereas Higher Education teaching or research professionals, mechanical and civil engineers, and environmental professionals are more likely to be working in other regions of the UK than in the Greater South East. Despite this, the findings did not find much variation by the socio-demographic characteristics of the workforce between the Greater South East and other regions.

Survey respondents were asked to rate the importance of various factors that influenced their decision to take up their current job. R&I workers from both outside and in the Greater South East indicated that the nature of the job itself was the most important reason to take up their current role. However, reasons around job security were mentioned more frequently outside the Greater South East than in the Greater South East (16% of those in the Greater South East said that the job providing security was crucial in their decision to take up their current job, compared to 20% of those elsewhere). Likewise, respondents outside the Greater South East were more likely to report job security as a reason for staying in the UK compared with the workforce living in the Greater South East (22% vs 16%).

The survey also asked respondents if they would consider working outside the UK in the next five years. Respondents' reasons for considering this varied by region, although overall likelihood of working abroad in the next five years did not (either in terms of considering this or having definite plans). The R&I workforce living outside the Greater South East were more likely to say that a better workplace culture (33% vs 25%), better work life balance (47% vs 41%), and better research facilities/infrastructure (39% vs 33%) could persuade them to work abroad. In contrast, people living in the Greater South East were more likely to report the lower cost of living as a reason they would consider working abroad (36% vs 28%).

In terms of grant funding, respondents outside the Greater South East were more likely to have applied for and received UKRI or Innovate UK grant funding for a specific R&I project. This difference might be explained by the fact that in our data, UKRI grant recipients are more likely to work in Higher Education compared to the overall sample, and these workers were in turn more likely to work in regions outside the Greater South East.

The R&I workforce is diverse, and challenges to attracting and retaining talent vary by region. Developing the R&I workforce in these regions is not simply about increasing funding. There needs to be a simultaneous effort to boost the R&I skills supply and demand that considers the UK's regional differences. Strengthening the current research

facilities and infrastructure and improving the culture of work and life balance are key drivers for promoting those regions as destinations for R&I talent.

### 3.6 Socio-demographic characteristics of the R&I workforce

The R&I workforce captured in this survey differs from the overall UK workforce on a number of demographic characteristics:

- Around 7 in 10 R&I workers are men (71%), compared to 53% of the overall UK workforce.
- The R&I workforce appears to be older than the UK workforce.
- The R&I workforce includes a larger proportion of people with work-limiting health conditions or impairments<sup>33</sup> (9%) than the UK workforce as a whole. This may be linked to the age of the workforce.

The proportion of the R&I workforce with non-British citizenship, appears to broadly reflect the UK workforce. However, it is also important to note that compared to R&D occupations in the Labour Force Survey, our survey sample shows a lower proportion of younger workers and a higher proportion of older workers across occupations.

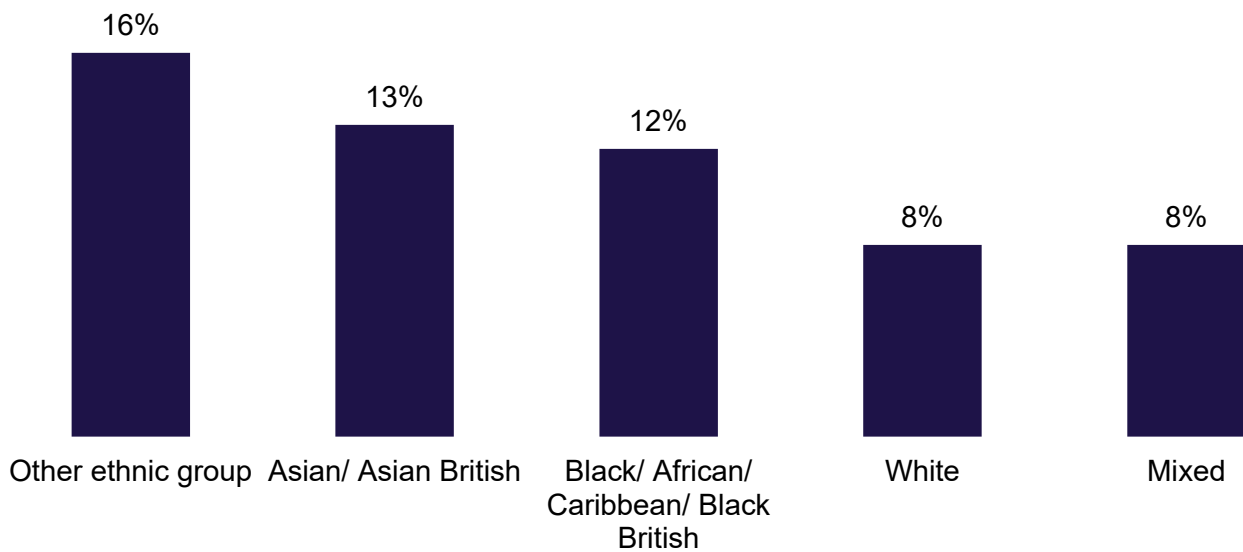
Table 3.10 provides a breakdown of the survey respondents in each sector by gender, ethnicity, and age. Around eight in ten (81%) R&I workers in the private sector are men. Women are better represented in Higher Education, but even here around six in ten (62%) of respondents were male. Differences by ethnic group are modest, except that respondents from the Asian/Asian British group are more likely to work in the NHS. Some caution is required here given the small size for this group. Differences by age are also modest, except that there were more younger workers in local or national government (29% of respondents in this sector were aged under 35).

Survey respondents were asked whether they agreed that their workplace culture supports diversity and inclusion. Overall, 75% of the R&I workforce agreed with this statement and only 8% disagreed. However, respondents from Black, Asian and 'other' ethnic groups were more likely to disagree with the statement compared to white respondents, and women were twice as likely to disagree as men (13% vs. 6%). Private sector respondents (83%) and those with organisational leadership roles (83%) were more likely to agree with this statement.

---

<sup>33</sup> Defined as people reporting any physical or mental health conditions or illnesses lasting or expected to last for 12 months or more, which reduce their ability to carry out day-to-day activities

**Figure 3.10: Proportion of the R&I Workforce who disagreed that their workplace culture supports diversity and inclusion by ethnicity**



*Base: All participants who are working and not self-employed (7331).*

Survey respondents were also asked to suggest, in their own words, how the government could better support them in their R&I career. Sixty respondents made suggestions related to improving diversity and equality, with 50 respondents commenting that policy action was required and 45 respondents calling for financial support. Twenty-five respondents suggested that bid reviewing processes should do more to avoid discrimination. There were specific mentions of support for women, with 32 respondents calling for increased financial support for women in research and 11 for greater support for childcare and caring responsibilities.

**Table 3.9: Socio-demographic characteristics of the R&I workforce**

| Characteristic           |                                      | R&I workforce | Entire UK workforce (LFS 2021) | R&D workforce (LFS 2020) |
|--------------------------|--------------------------------------|---------------|--------------------------------|--------------------------|
| Gender                   | Men                                  | 71%           | 53%                            | 73%                      |
|                          | Women                                | 29%           | 47%                            | 27%                      |
| Age                      | 16 – 34                              | 7%            | 35%                            | 36%                      |
|                          | 35 – 44                              | 23%           | 22%                            | 26%                      |
|                          | 45 – 54                              | 30%           | 22%                            | 21%                      |
|                          | 55 – 64                              | 26%           | 17%                            | 14%                      |
|                          | 65+                                  | 13%           | 4%                             | 3%                       |
| Ethnicity                | White                                | 89%           | 86%                            | 84%                      |
|                          | Asian / Asian British                | 5%            | 7%                             | 10%                      |
|                          | Black / Black British                | 2%            | 3%                             | 2%                       |
|                          | Mixed                                | 2%            | 1%                             | 2%                       |
|                          | Other                                | 3%            | 2%                             | 2%                       |
| Nationality              | British (including dual citizenship) | 86%           | 86%                            | 83%                      |
|                          | Non-British                          | 14%           | 14%                            | 17%                      |
| Work limiting disability | Yes                                  | 9%            | 4%                             | 2%                       |
|                          | No                                   | 91%           | 96%                            | 98%                      |

Source: R&I Workforce Survey 2022 / Labour Force Survey 2021. Where answers do not sum to 100, this is due to rounding

**Table 3.10: Current sector of employment and socio-demographic characteristics of the workforce**

| Sector                                      | Gender     |            | Ethnicity  |           |                       |                      |                    | Age       |            |            |            |            |
|---|------------|------------|------------|-----------|-----------------------|----------------------|--------------------|-----------|------------|------------|------------|------------|
|   | Male       | Female     | White      | Mixed     | Asian / Asian British | Black/ Black British | Other ethnic group | 16 - 34   | 35 - 44    | 45 - 54    | 55 - 64    | 65+        |
| <b>Overall R&amp;I workforce (weighted)</b> | <b>71%</b> | <b>29%</b> | <b>89%</b> | <b>2%</b> | <b>5%</b>             | <b>2%</b>            | <b>3%</b>          | <b>7%</b> | <b>23%</b> | <b>30%</b> | <b>26%</b> | <b>13%</b> |
| Private sector                              | 81%        | 19%        | 88%        | 2%        | 5%                    | 2%                   | 2%                 | 8%        | 19%        | 28%        | 28%        | 18%        |
| Higher Education                            | 62%        | 38%        | 90%        | 2%        | 5%                    | 1%                   | 3%                 | 6%        | 28%        | 32%        | 25%        | 9%         |
| Further Education                           | 65%        | 35%        | 92%        | 2%        | 0%                    | 4%                   | 2%                 | 2%        | 24%        | 41%        | 22%        | 10%        |
| Public sector research                      | 69%        | 30%        | 89%        | 2%        | 4%                    | 2%                   | 3%                 | 9%        | 23%        | 29%        | 26%        | 13%        |
| NHS   | 57%        | 43%        | 84%        | 2%        | 9%                    | 1%                   | 5%                 | 6%        | 25%        | 35%        | 25%        | 10%        |
| Local or national government                | 55%        | 44%        | 89%        | 4%        | 4%                    | 2%                   | 1%                 | 29%       | 22%        | 22%        | 19%        | 8%         |
| Other public sector                         | 68%        | 32%        | 93%        | 1%        | 3%                    | 2%                   | 2%                 | 10%       | 25%        | 26%        | 25%        | 14%        |
| Non-profit organisations                    | 59%        | 39%        | 85%        | 3%        | 5%                    | 3%                   | 3%                 | 9%        | 24%        | 28%        | 26%        | 11%        |

Where answers do not sum to 100, this is due to rounding. Data are not weighted except for overall workforce row.



## 4. Skills, qualifications and career paths of the R&I workforce

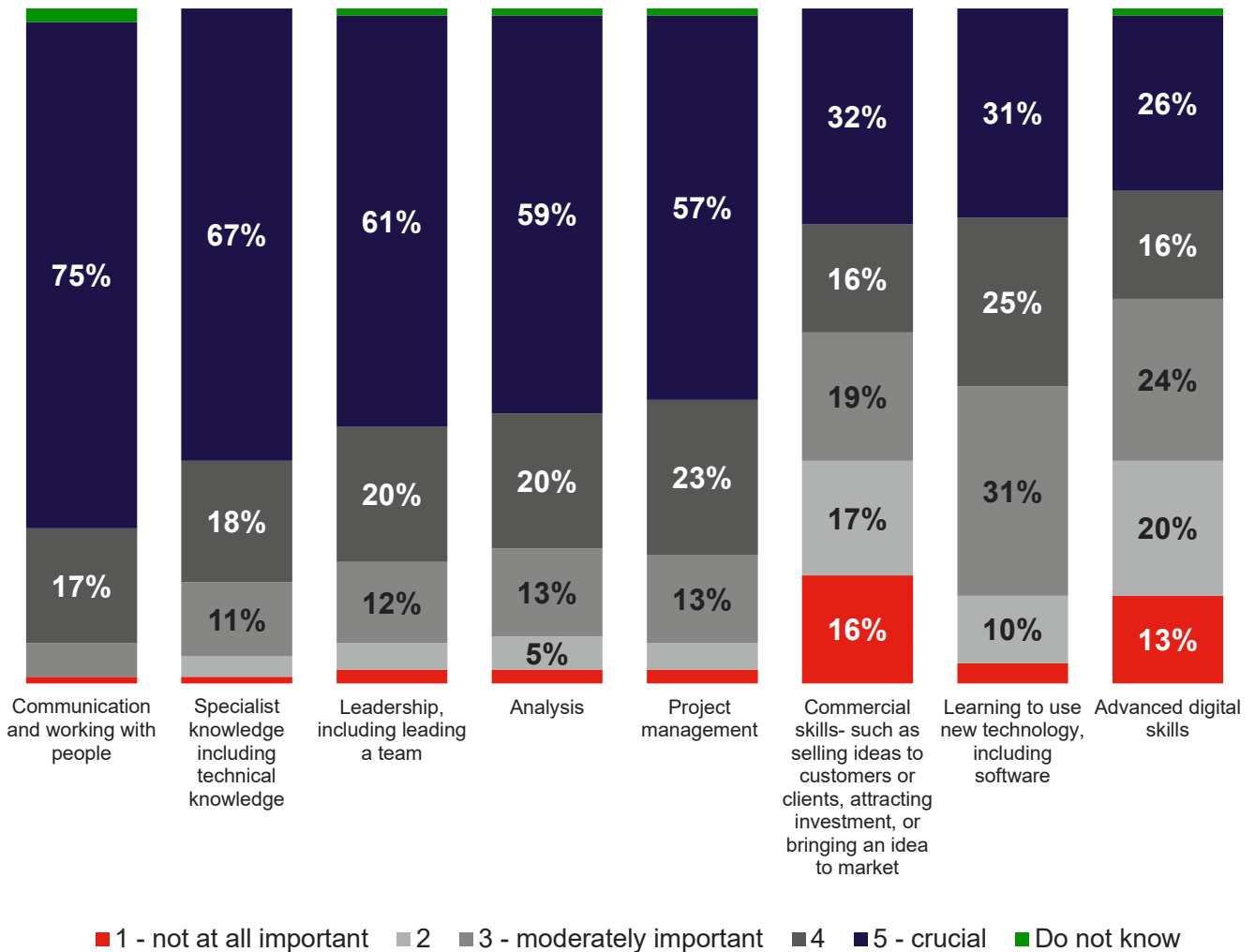
The R&D People and Culture Strategy and the UK Innovation Strategy highlight the importance of addressing skills shortages and promoting varied and dynamic career paths of R&I workforce to fulfil UK's R&D, science and innovation ambitions. This chapter provides a range of findings relating to the background and career paths of the R&I workers surveyed (including their qualifications, career length, and experience of working in different sectors) as well as their skills and skills needs.

### 4.1 Current skills needs of the workforce

#### Skills needed for current job

Survey respondents were asked to rate the importance of various skills for their current role. Across the sampled workforce as a whole, communication and working with people was seen as the most important skill, with three-quarters of respondents (75%) describing this as essential for their current job and only 1% of respondents rating this skill as less than moderately important. This was followed by specialist and technical knowledge, leadership, analysis, and project management. Advanced digital skills were seen as least important, but still recognised as at least moderately important by two-thirds of respondents (66%).

**Figure 4.1: Self-reported importance of skills for current job role**



Base: Participants who are working (7,499)

The table below shows the average rating for each skill across respondents from each sector, where 1 is not at all important, 3 is moderately important and 5 is essential. Communication and working with people was seen as the most important skill in all sectors, most of all by those working in the NHS. The only skills rated as less than moderately important on average were commercial skills (particularly so for those working in Higher Education institutions) and advanced digital skills for those working in the public sector (outside of research organisations and local or national government).

**Figure 4.2: Skills needs identified by respondents by sector (with 1 being not at all important and 5 being essential)**

|  | Private sector businesses | Higher education institutions | Further Education colleges | Public sector research organisation/s | National Health Service | Local or national government | Other public sector | Non-profit organisation, charity or community organisation/s | Overall workforce |
|--|---------------------------|-------------------------------|----------------------------|---------------------------------------|-------------------------|------------------------------|---------------------|--|-------------------|
| Communication and working with people              | 4.68                      | 4.7                           | 4.79                       | 4.68                                  | 4.83                    | 4.71                         | 4.74                | 4.81   | 4.68              |
| Specialist knowledge including technical knowledge | 4.35                      | 4.67                          | 4.58                       | 4.62                                  | 4.48                    | 4.35                         | 4.34                | 4.45   | 4.48              |
| Leadership, including leading a team               | 4.38                      | 4.39                          | 4.45                       | 4.28                                  | 4.61                    | 4.16                         | 4.38                | 4.4  | 4.36              |
| Project management                                 | 4.22                      | 4.44                          | 4.23                       | 4.2                                   | 4.47                    | 4.1                          | 4.32                | 4.45   | 4.3               |
| Analysis   | 4.07                      | 4.59                          | 4.13                       | 4.31                                  | 4.13                    | 4.28                         | 4.17                | 4.31   | 4.29              |
| Learning to use new technology, including software | 3.73                      | 3.71                          | 3.92                       | 3.92                                  | 3.72                    | 3.58                         | 3.47                | 3.69   | 3.72              |
| Commercial skills                                  | 4.17                      | 2.33                          | 3.94                       | 2.83                                  | 2.93                    | 2.92                         | 3.21                | 3.35   | 3.3               |
| Advanced digital skills                            | 3.16                      | 3.31                          | 3.42                       | 3.46                                  | 2.97                    | 3.16                         | 2.76                | 3.18   | 3.22              |

Base: Participants who are working (7,499). 1= not at all important; 5= essential. The darker the red, the more important the skill was rated as. Data are not weighted.

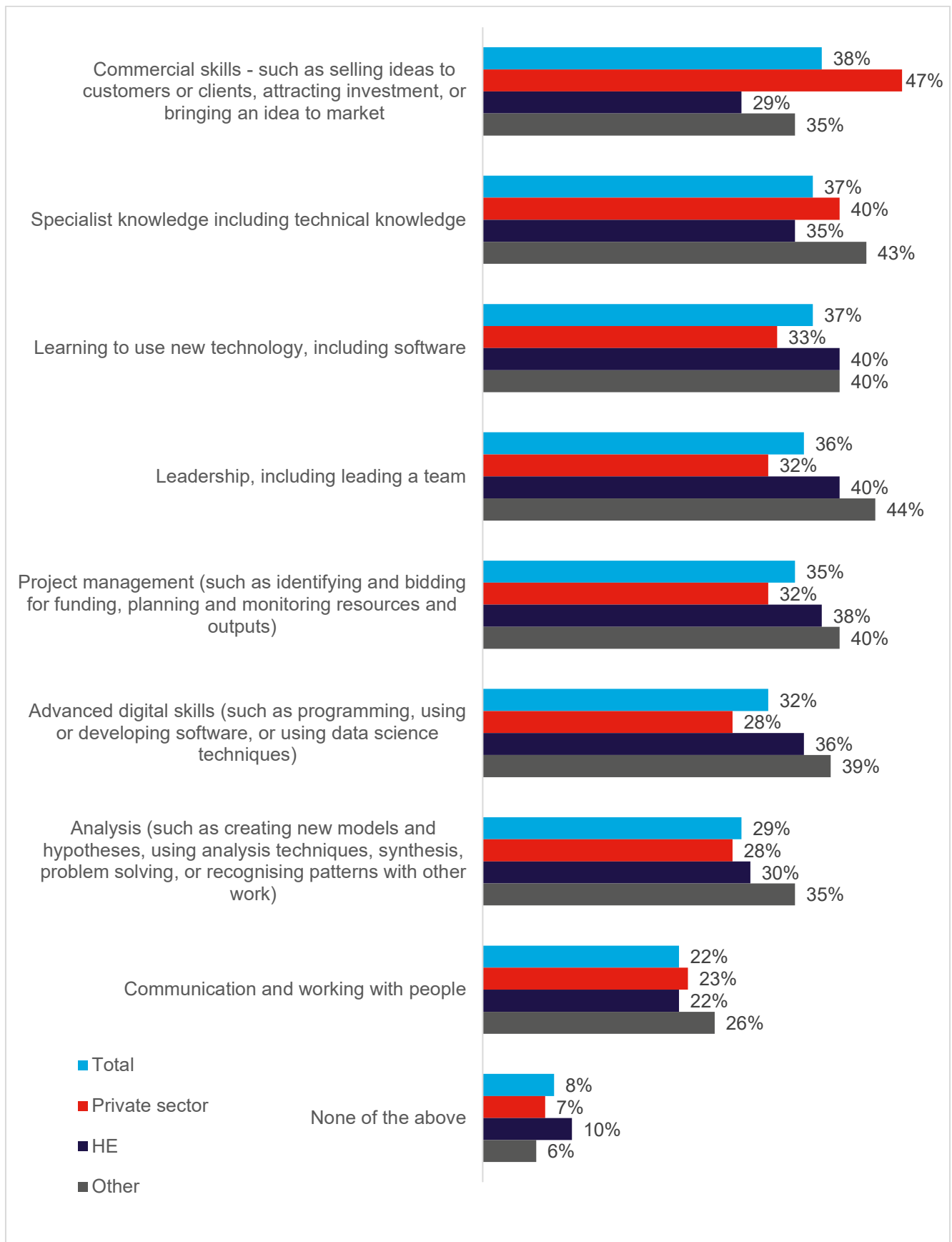
Respondents with doctorate-level qualifications were more likely than those with other qualifications to say they needed specialist knowledge and analytical skills, whereas respondents with no qualifications were more likely to say they needed commercial skills. This likely reflects the sectors in which these respondents are more likely to be working (Higher Education and private sector businesses respectively).

### Skills needed for career progression

Respondents were also asked what skills they would need further training or development on to progress their career in R&I. Commercial skills were most frequently identified here, with 38% of respondents overall reporting a need to develop these, rising to 48% of those mostly working on non-Frascati R&I. Although commercial skills were rated as relatively less important by those in Higher Education settings, 29% of such respondents identified a need to develop these skills nevertheless.

The next most commonly identified skills needed for career progression were specialist knowledge, and skills to use new technology (both 37%). Only 1 in 5 respondents believed they needed to develop their communication skills further (22%). This is shown in Figure 4.3.

**Figure 4.3: Skills needed for career progression in the UK R&I workforce**



Base: All respondents (7,519). Total %s are weighted, individual sector %s are not.

Skills needs varied by career length. Relative to those at other career stages:

- researchers and innovators with less than 2 years' experience were more likely to identify that they needed to develop their skills in project management
- those with between 2 and 10 years' experience reported needing to develop their technical skills, analysis and commercial skills
- those with between 6 and 15 years' experience reported needing to develop their advanced digital skills and leadership skills
- those with more than 15 years' experience were more likely to say they had no need to develop any of the skills listed (11%, compared to 8% of the R&I workforce surveyed).

As noted in table 3.9, the R&I workforce appears to have relatively fewer younger workers than the UK workforce, which combined with skills gaps may be a concern for future R&I policies to address.

## 4.2 Qualification levels

### Education levels

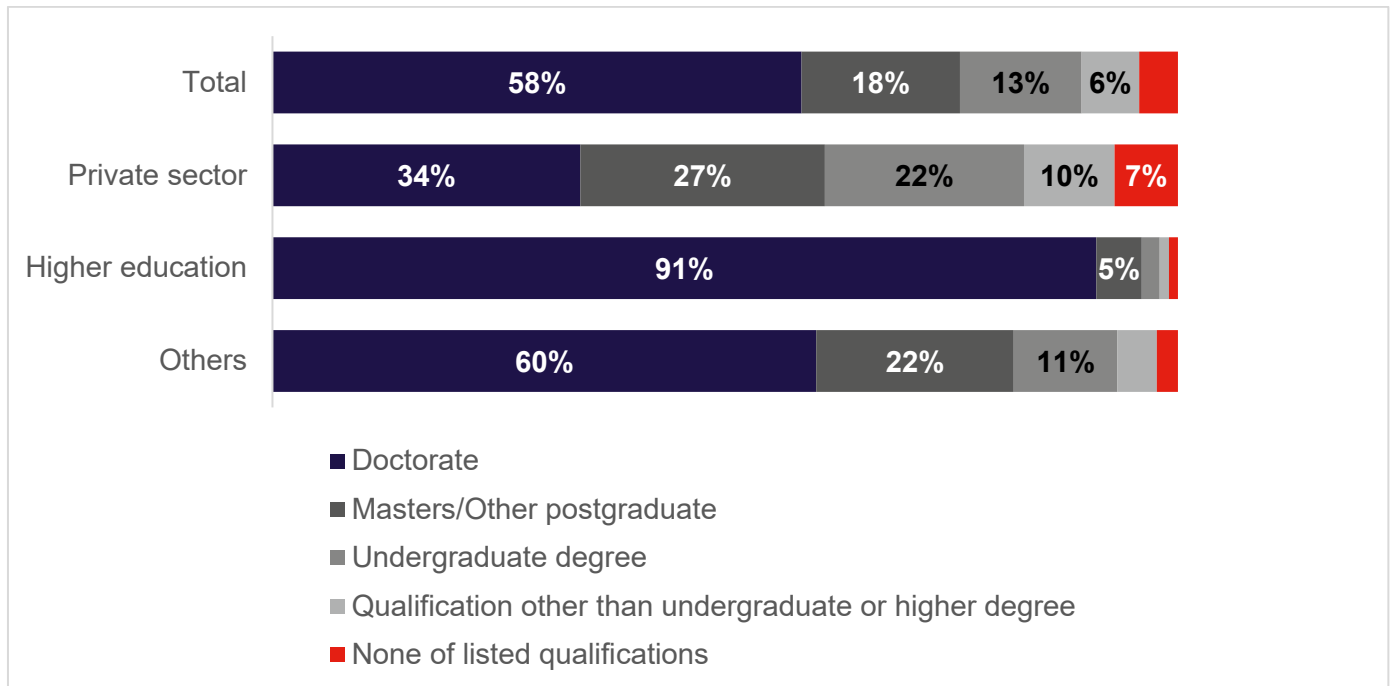
The R&I workforce is educated to a much higher level than the UK's workforce as a whole. The majority of the R&I workforce is qualified at degree level or above; only 4% of the R&I workforce surveyed reported having none of the qualifications listed. 58% had a doctorate, compared with 2% of the UK workforce overall, and three-quarters of the sample (76%) reported having some postgraduate qualifications, although this varied by sector, with 96% of those working in Higher Education having postgraduate qualifications compared to 61% in the private sector, 71% in government and further education, 86% in public sector research organisations and the NHS, and 67% in the rest of the public sector<sup>34</sup>. Among respondents with postgraduate qualifications, 77% had a doctorate and 42% had a master's degree.

Four per cent of respondents reported having none of the qualifications listed in the questionnaire, rising to 6% of those working in Further Education colleges, and 7% of those working in the private sector. Six per cent of the R&I workforce surveyed reported having a higher-level/graduate/degree apprenticeship.

---

<sup>34</sup> E.g., policy, military, secondary schools, museums and arm's-length bodies

**Figure 4.4: Highest level of qualification by sector**



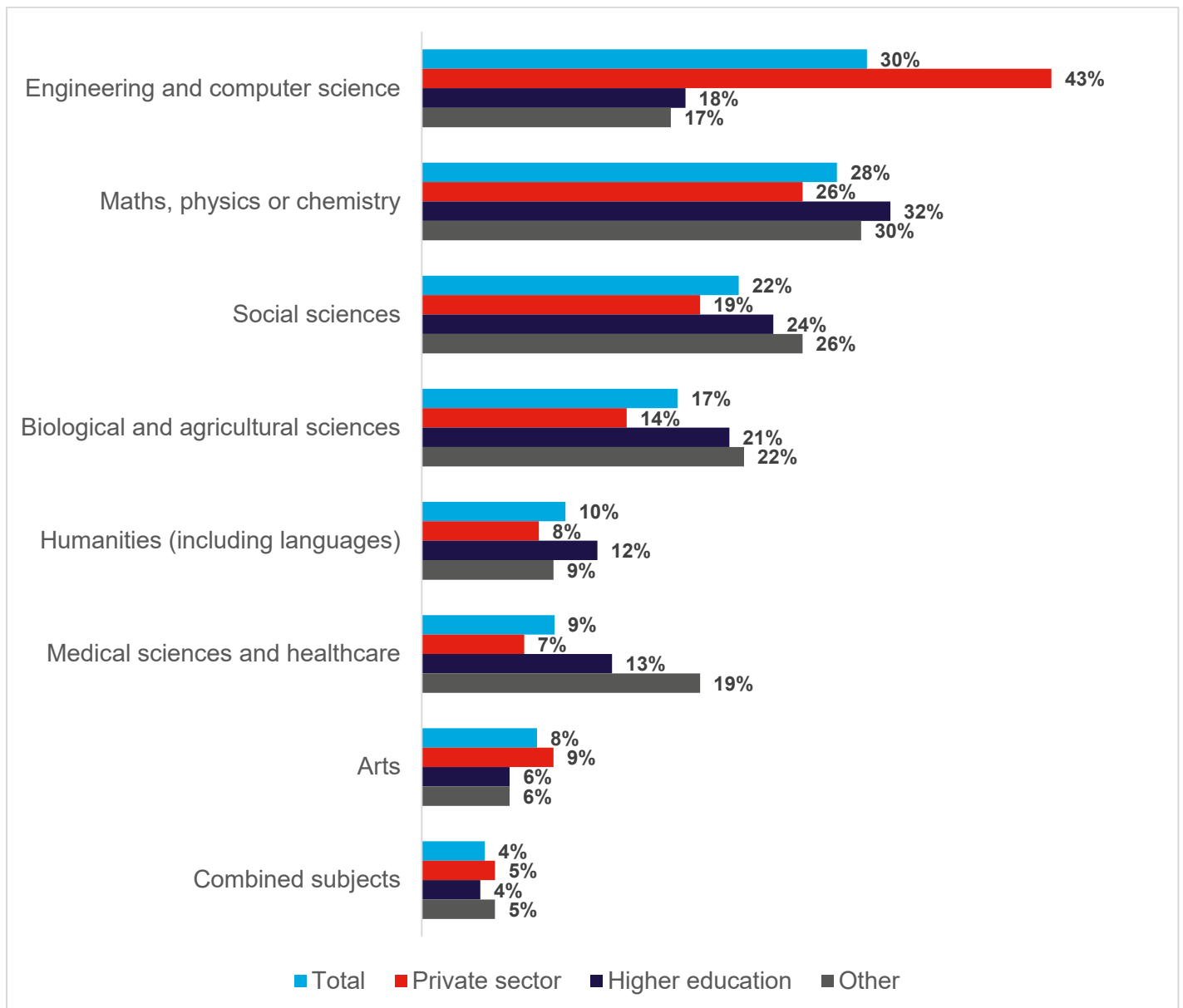
*Base: All respondents (7,519); Private sector 1,793; Higher Education 5,130; Others 1,379. Total %s are weighted, individual sector %s are not.*

There is not much variation in qualifications between demographic groups. Of those with postgraduate qualifications, women are slightly more likely than men to have a doctorate, and respondents from the Black/Black British ethnic group are less likely to have a doctorate, though a degree of caution is required here because of the relatively small sample size.

Over a third of those working in R&I report being a member of a professional institution (37%) but again, there is not much variation by the socio-demographic characteristics of the workforce.

Figure 4.5 shows the subjects of the degrees held by respondents; respondents could select more than one subject. Within our sample, the most commonly held qualifications in terms of subject were STEM: engineering and computer science (30%) followed by maths, physics and chemistry (28%). There is a tendency to think of R&I as being STEM focussed to some degree. However, Figure 4.5 shows that a sizable share of the R&I workforce reported having degree-level qualifications in social science (22%).

**Figure 4.5: Subjects of degrees and higher degrees**



Base: All respondents with a qualification at degree level or above (7,213). Private sector 1,597; Higher Education 5,055; other 1,323. Total is weighted, individual sectors are not. Respondents could select multiple options

Overall, around 4 in 5 of these qualifications had been achieved in the UK. Graduate memberships of professional institutions, postgraduate qualifications in education and higher-level apprenticeships were most likely to have been achieved in the UK. Foundation degrees and master’s degrees were the qualifications most likely to be completed outside the UK (26% and 22% of these respectively were completed outside the UK).

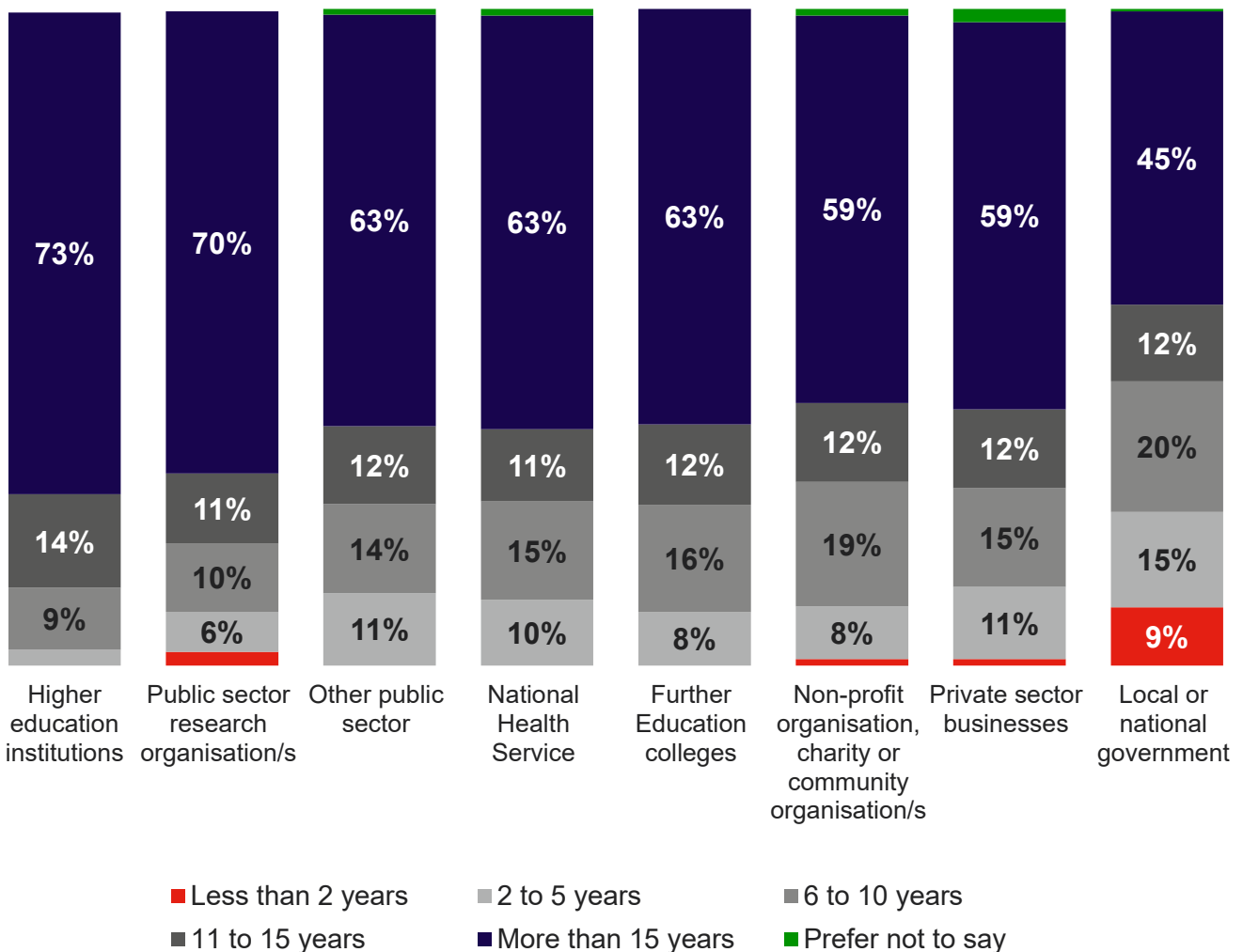
### 4.3 Career length in R&I

Figure 4.6 shows the career length of those working in R&I; in other words, how long they had been working in R&I to date altogether, which may have included several employers, sectors or roles.

Two-thirds of our sample (64%) had worked in R&I for more than 15 years, with 9% having less than 5 years' experience. The overall average career length to date was 22 years.

Academics tended to have had longer careers, with only 2% of those working in academia reporting 5 years' experience or less, compared to 24% in local or national government, 12% in the private sector, 10% in the NHS, and 9% in public-sector research organisations and the not-for-profit sector. Likewise, those mostly working on Frascati R&D are more likely to have had longer careers than those mostly working on non-Frascati R&I.

**Figure 4.6: Length of careers of survey respondents by sector worked in**



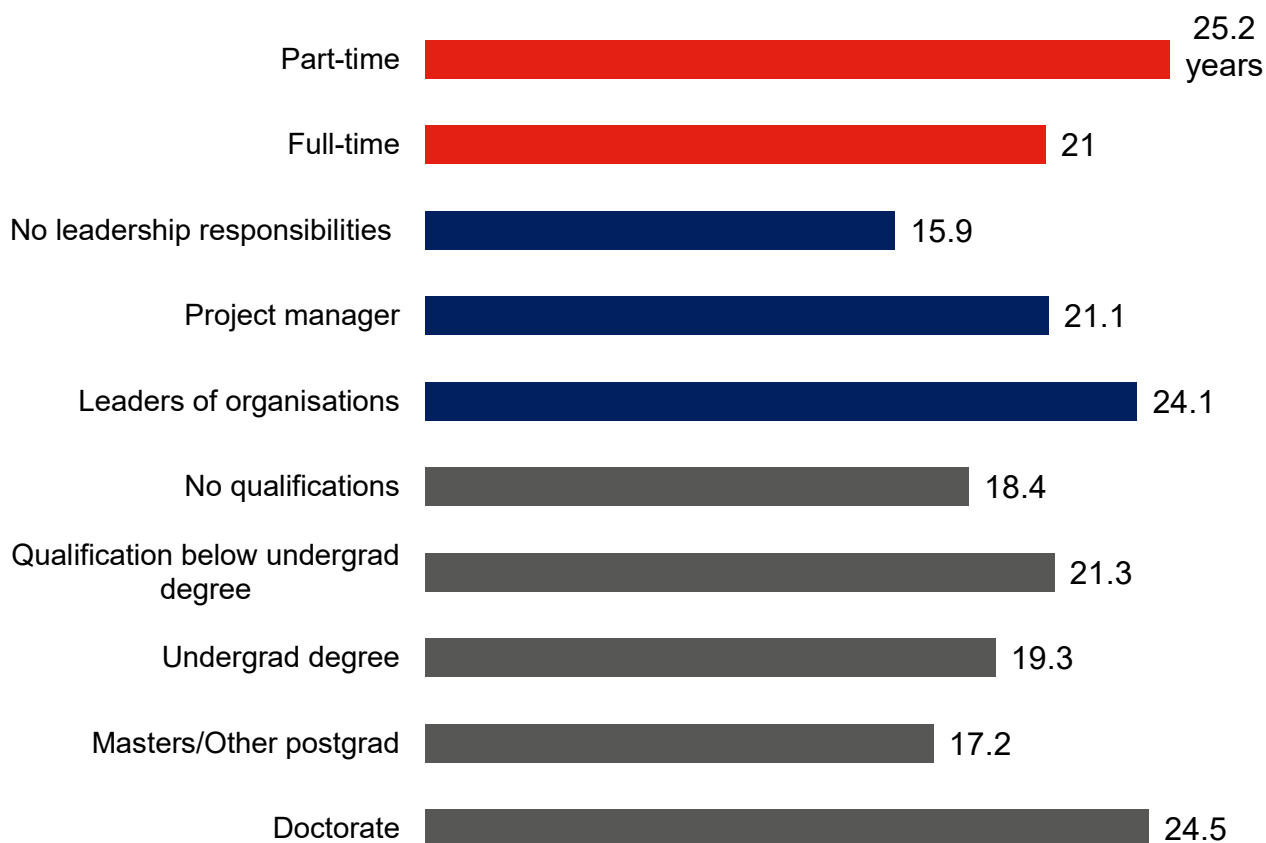
Base: All respondents (7,519). Totals may not sum to 100% due to rounding. Data are not weighted.

Generally, there was little variation in career length by the type of research conducted. However, those working in AI, Digital and Advanced Computing were also more likely to have had shorter careers to date: 11% had less than 5 years' experience, although even in this technology family 60% of the R&I workforce surveyed had had a career lasting over 15 years.



More variation is evident with respect to the socio-demographic characteristics of the workforce. On average, women and Black/Black British respondents had had shorter careers to date (19 years and 14 years respectively). Figure 4.7 goes on to show variation by levels of educational attainment and employment characteristics. Those with doctorates, a high level of responsibility in the organisation, and those working part-time have had relatively longer R&I careers to date.

**Figure 4.7: Duration of careers in R&I by education level and employment (years)**



Base: All respondents (7,519)

## 4.4 Sector mobility

To understand mobility between sectors, respondents were asked what sectors they had previously worked in during their career in R&I. Overall, around half of respondents (48%) had previously worked in different sector/s than those they currently worked in, although this was only the case for 43% of academics. Those mostly working on Frascati R&D activities were less likely to have experience in a different sector (47%) than those mostly working on other types of R&I (51%).

The table below presents the workforce’s previous experience by current sector. Overall, 62% of the R&I workforce surveyed have worked in Higher Education and 58% have worked in the

private sector at some stage in their career. Around half of the workforce in government and the not-for-profit sector had experience of working in R&I in the private sector, and a slightly larger proportion has experience of working in Higher Education (52% and 61% respectively). More than 2 in 5 private-sector researchers and innovators (44%) have experience of R&I within Higher Education, a higher proportion than the reverse (25% of academics have private-sector R&I experience). Table 7.8 in the annex provides a breakdown of sector mobility by occupation.

**Figure 4.8: Sectors previously worked in by current sector**

| Sectors worked in  | Current sector |                           |                               |                            |                                       |                         |                              |                     |  |
|--|----------------|---------------------------|-------------------------------|----------------------------|---------------------------------------|-------------------------|------------------------------|---------------------|--|
|  | All            | Private sector businesses | Higher education institutions | Further Education colleges | Public sector research organisation/s | National Health Service | Local or national government | Other public sector | Non-profit organisation, charity or community organisation/s |
| Private sector businesses                                    | 58%            |                           | 25%                           | 69%                        | 39%                                   | 27%                     | 48%                          | 63%                 | 50%  |
| Higher education institutions                                | 62%            | 44%                       |                               | 57%                        | 62%                                   | 75%                     | 52%                          | 54%                 | 61%  |
| Further Education colleges                                   | 4%             | 6%                        | 3%                            |                            | 6%                                    | 5%                      | 11%                          | 12%                 | 10%  |
| Public sector research organisation/s                        | 17%            | 18%                       | 16%                           | 41%                        |                                       | 18%                     | 27%                          | 26%                 | 40%  |
| National Health Service                                      | 7%             | 7%                        | 9%                            | 14%                        | 9%                                    |                         | 13%                          | 12%                 | 11%  |
| Local or national government                                 | 9%             | 12%                       | 7%                            | 24%                        | 13%                                   | 13%                     |                              | 36%                 | 19%  |
| Other public sector  | 7%             | 9%                        | 5%                            | 18%                        | 9%                                    | 7%                      | 20%                          |                     | 16%  |
| Non-profit organisation, charity or community organisation/s | 14%            | 17%                       | 12%                           | 27%                        | 20%                                   | 18%                     | 26%                          | 27%                 |  |

Base: all respondents (7,519). Data are not weighted.

## 5. Working conditions and career incentives and motivations for the R&I workforce

Understanding motivations and incentives for people choosing and continuing to work in R&I occupations is crucial to growing the R&I workforce to meet employers' demand. This section also shows that the R&I workforce is highly internationally mobile and presents opportunities for the UK to attract and retain most talented R&I workers. This section also covers responses relating to working conditions such as hours and work location as well as the role of government support in the form of grants.

### 5.1 Incentives in pursuing a career in UK R&I

#### Reasons for taking up current job

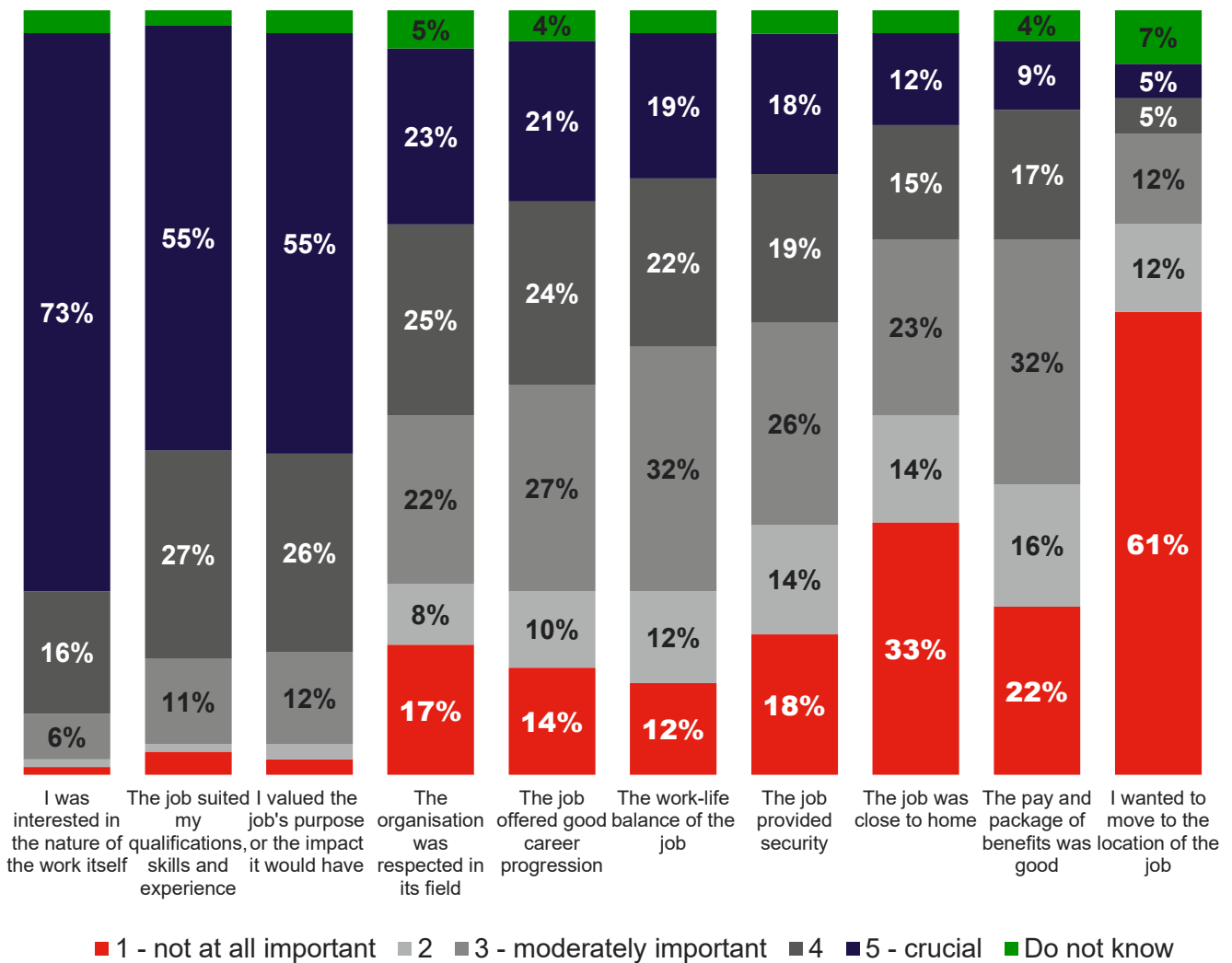
To explore which factors motivate people working in R&I to change or remain in their jobs, the survey asked respondents who were currently working about their reasons for taking up their current job.

The nature of the job itself, and whether it was interesting and meaningful, was reported as more important than considerations such as location, security, pay or progression opportunities. Across the workforce as a whole, interest in the nature of the work itself was seen as the most important factor, with three-quarters of respondents (73%) describing this as crucial and only 1% of respondents rating this reason as not at all important. This was followed by the job's purpose or the impact it would have, and the job suiting the respondent's qualifications, skills and experience, with over half of respondents (55% for both) rating these as crucial reasons for taking up their current job.

Wanting to move to the location of the job was seen as the least important factor, with only 5% of the R&I workforce surveyed rating it as crucial. This was likely aided by the fact that over three-quarters (77%) of those surveyed worked either fully or partially at home.

Similarly, for respondents who were not currently working, interest in the nature of the work itself was seen as the most crucial factor when looking for a job, with 85% of these respondents rating this as essential. This was followed by the job's purpose or impact it would have, with 70% describing it as an essential factor when looking for a job; and the job suiting their qualifications, skills and experience, with 46% rating it as essential.

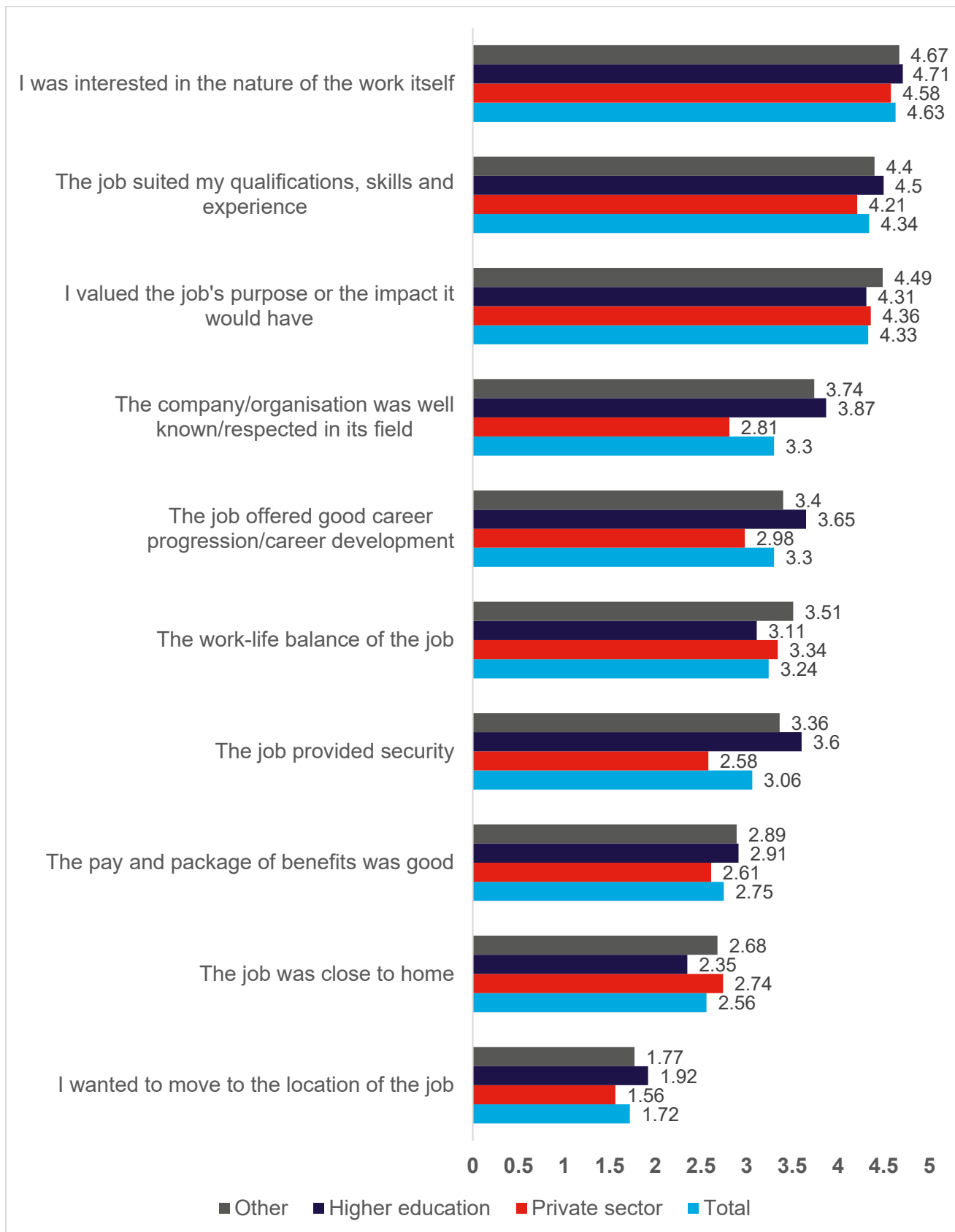
**Figure 5.1: Importance of factors in decision to take up current job**



Base: Participants who are working (7,499). Some bars do not sum to 100% due to "do not know" responses.

The nature of the work, and that this be suited to the respondent's skills and experience, was rated as consistently important across sectors. Private-sector respondents placed less importance on working for a well-known or respected organisations, on career progression opportunities and on job security than respondents in other sectors. Respondents in Higher Education were less motivated by the job being close to home and more likely to say that the job being in a location they wanted to move to was important to them than respondents in other sectors.

**Figure 5.2: Importance of factors in decision to take up current job**



Average scores given by respondents when asked to rank each skill from 1 to 5 where 1 means not at all important, 3 means moderately important and 5 means essential. Base: Respondents who are working (7,499). Private sector 1,793; Higher Education 5,130; Others 1,379. Total %s are weighted, individual sector %s are not.

The youngest of those in our sample, aged 16-34, were significantly more likely to describe the job offering good career progression or career development as an important factor in their decision to take up their current job than older workers that were surveyed. In addition, those with less seniority within their organisation, who described themselves as having 'no leadership responsibilities', were more likely than more senior respondents to rate the work-life balance of the job and the job being close to home as important factors in taking up their current job. Those working in the private sector were also more likely to rate the work-life balance of the job as important compared to those working in Higher Education institutions and the NHS.

## Obstacles R&I workers face to advancement and mobility

To understand how those in the UK R&I workforce felt about how the government could support them better in their career, the survey asked an open question in which respondents could answer in their own words. 5,947 respondents provided an answer to this question. This provided some suggestions relating to advancement and mobility specifically:

- 196 respondents called for better career progression opportunities and 110 wanted to see clearer career paths/structures
- 162 respondents believed the government could support initiatives to reduce staff turnover and aid retention in their organisation, while 133 wanted to see improved recruitment and talent acquisition
- 148 respondents wanted the government to facilitate networking opportunities and 93 wanted initiatives to provide mentoring and role models
- 133 respondents called for increased financial support for early-career researchers
- 57 wanted support with career transitions

## 5.2 What is the working culture that R&I workers experience?

### Views on working culture

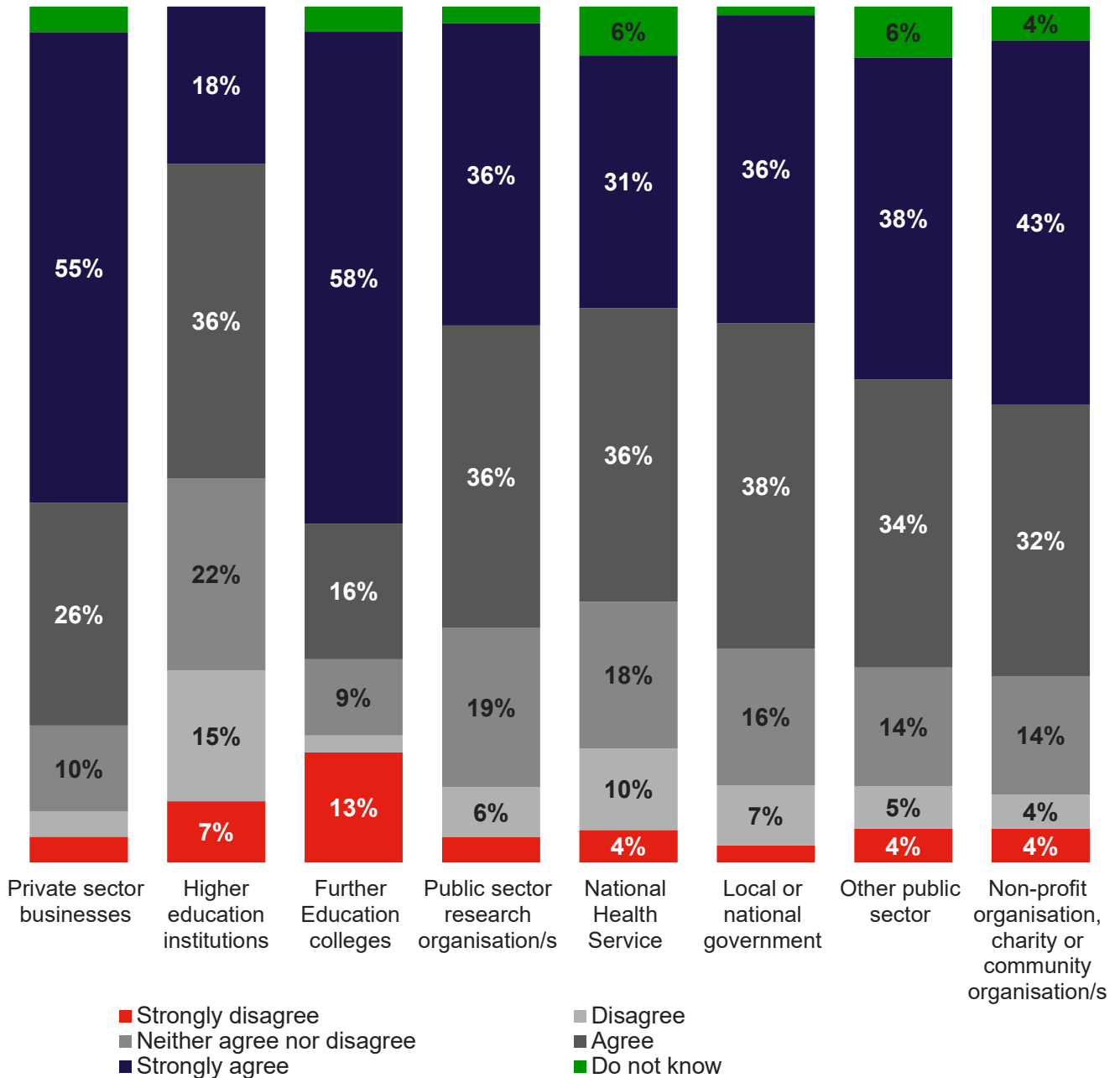
Respondents were asked about the working culture of their organisation. The majority of respondents (69%) agreed that their organisation's culture supported them to do their best work. The highest levels of agreement with this were seen in the private sector (81%), the not-for-profit sector (75%), Further Education colleges (74%), and local or national government (74%).

Only 13% of the overall workforce disagreed that their organisation's culture encouraged them to do their best work, but this proportion was higher in Higher Education institutions, with over a fifth disagreeing (22%).

Levels of agreement were lower for project manager/supervisor roles (35%) compared to organisation leaders (67%) and those with no leadership responsibilities (42%). Women were more likely to disagree that their organisation's culture encourages employees to do their best

work (17% compared to 11% of men), while responses were similar for white and ethnic minority respondents.

**Figure 5.3: Level of agreement that organisation’s culture encourages employees to do their best work**



Base: All respondents who are working and not self-employed (7,331). Data are not weighted.

Respondents were also asked about whether they felt confident in challenging the way things were done at their organisation. Overall, two-thirds of respondents (66%) agreed with this statement, but levels of agreement were much lower in Higher Education institutions (47%) and highest in the private sector (81%). People in leadership roles were more likely to feel



confident than the overall sample in challenging the way things were done (78%), and men were more confident than women (70% versus 56% agreeing respectively).

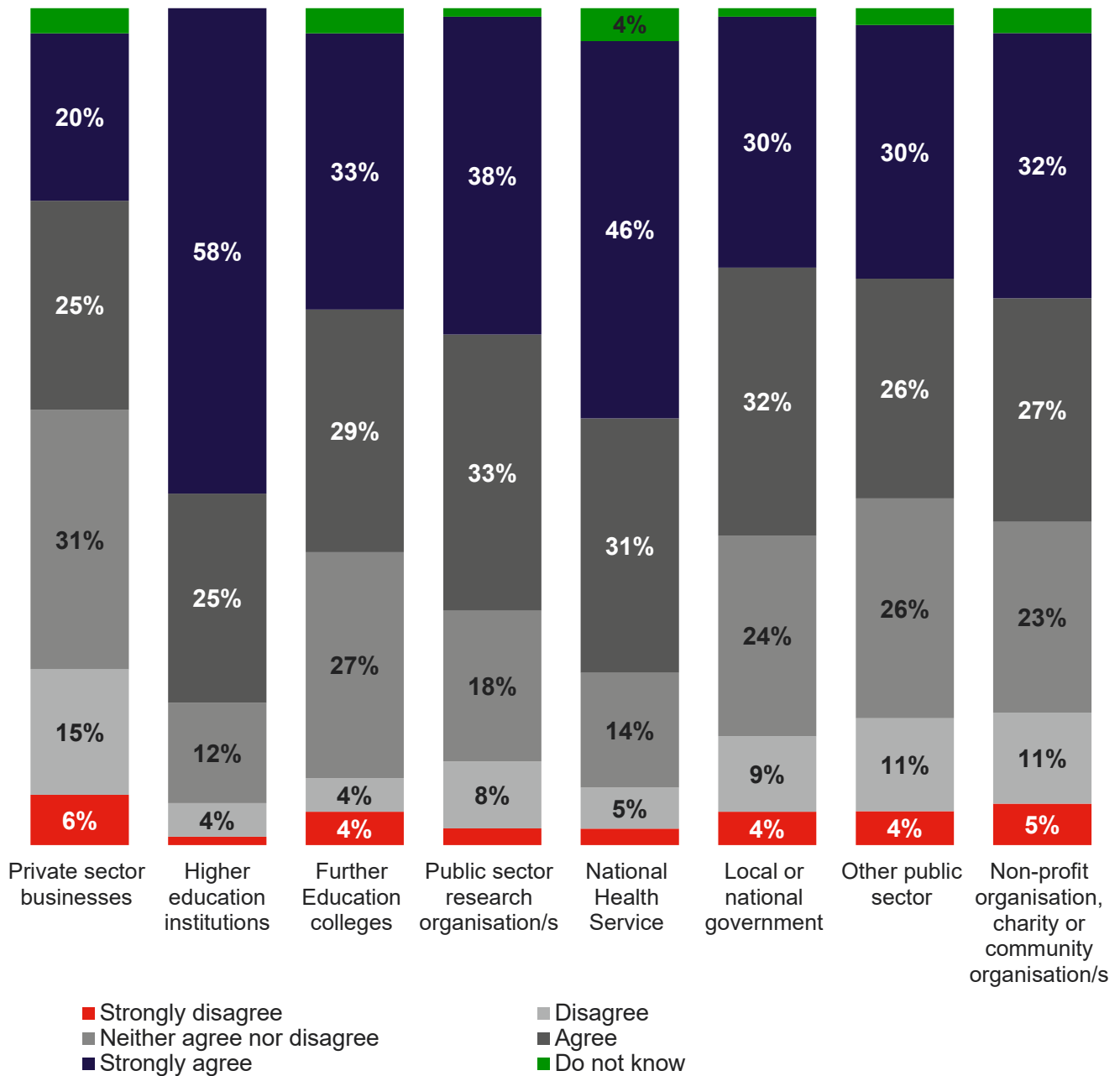
## Administrative tasks and processes

One factor which may prevent researchers and innovators from working effectively is the burden of administrative tasks and processes. The majority of respondents (62%) agreed that administrative tasks and processes took up too much time at their organisation.

This seems to be a particularly significant issue for academics, with more than 4 in 5 agreeing that administration takes up too much time, but even in the private and not-for-profit sectors there were around twice as many respondents agreeing with this statement than disagreeing (45% and 59% of workers in the private and not-for-profit sectors, respectively, agreed).

Women were more likely than men to report that administrative tasks took up too much time at their organisation (71% of women agree vs. 59% of men), and project managers or supervisors were also more likely to agree with this (78%) than those with either organisational leadership responsibilities (59%) or no leadership responsibilities (54%).

**Figure 5.4: Level of agreement that administrative tasks and processes take up too much time at their organisation**



Base: All respondents who are working and not self-employed (7,331). Some bars do not sum to 100% due to “don’t know” and “prefer not to say” responses. Data are not weighted.

When asked to suggest in their own words how the UK government could support them in their R&I career, improvements to working conditions were mentioned by 1,060 respondents (one in seven). The most common suggestions related to better pay and benefits, better career progression opportunities, greater staff retention, and a reduced workload or better work-life balance.

## Working hours

Overall, 73% of those in the R&I workforce worked full-time<sup>35</sup>, a slightly lower proportion than in the UK workforce as a whole (75%). The mean number of hours respondents were paid to work was 36.5, with 69% of respondents working between 31 and 40 hours per week. Fewer than one in ten respondents worked fewer than 31 hours (9%) and one in twenty (4%) were paid to work for more than 40 hours a week. However, real hours worked may be higher than the hours respondents are paid to work. For example, BEIS and Vitae's survey on the impact of COVID-19 on researchers found that before the COVID-19 pandemic, full-time researchers in Higher Education and public research institutes worked an average of 44 hours per week<sup>36</sup>.

There was relatively little variation in working hours in terms of sector, occupation or personal characteristics. The largest difference was that those with organisational leadership responsibilities worked on average 3 hours longer per week than those with no project or organisational leadership responsibilities.

## Remote working

As has been mentioned previously, over three-quarters (77%) of our sample work at home in some capacity. Most workers had hybrid work patterns, with 59% of respondents working from home and another fixed place location. One in five (21%) worked only at a fixed place of work and a similar proportion (18%) worked entirely from home.

Respondents working in the private sector were more likely to work entirely from home than those in Higher Education (28% and 7%, respectively), and those undertaking mostly non-Frascati R&I activities were also more likely to work entirely from home and less likely to work elsewhere than those undertaking formal R&D (24% vs. 16% at home only). Those with no leadership responsibilities were twice as likely to work exclusively from home than those with organisation, project or team leadership roles.

## 5.3 Grants and Government Support

Nearly 9 out of 10 respondents (87%) reported having applied for UKRI or Innovate UK grant funding for a specific R&I project, including funding from a Research Council, and three-quarters (74%) had received such funding. However, this is likely to reflect that much of the recruitment for the survey took place using grant application lists provided by UKRI and Innovate UK, and therefore grant applicants and recipients are likely to be over-represented in the sample. We do not know the true proportion of the workforce that has ever received funding from UKRI in their career, but for context, in 2021-22, UKRI supported 60,285 individuals with grant awards to support their research and in some cases their wider research

---

<sup>35</sup> We counted people paid to work for 35 or more hours each week as full-time.

<sup>36</sup> <https://www.vitae.ac.uk/impact-and-evaluation/covid-19-impact-on-researchers>

teams<sup>37</sup> (compared to an R&I workforce estimated to be over 1.6 million, based on selected SOC codes).

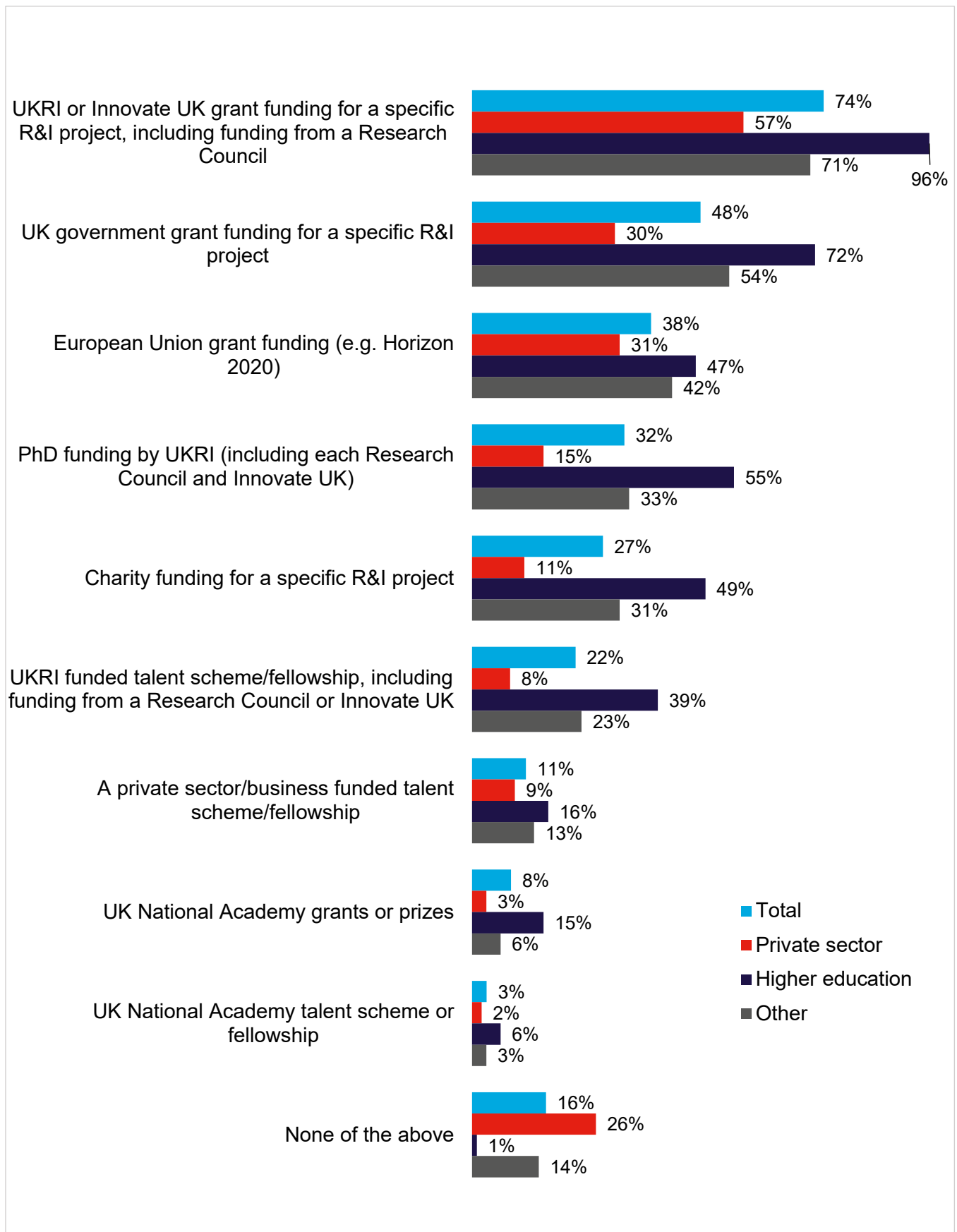
Other sources of funding respondents reported receiving included other UK government grant funding for a specific R&I project (48%), European Union grant funding (such as Horizon 2020) (38%), PhD funding by UKRI including each Research Council and Innovate UK (32%), charity funding for a specific R&I project (27%), and UKRI funded talent scheme/fellowships, including funding from a Research Council or Innovate UK (22%).

Across all types of funding listed, those working in Higher Education were more likely to have applied for and received funding than those in the private sector or other sectors. The only exception was private-sector-funded talent schemes or fellowships, where those working in the public sector or non-profits were equally likely to have benefited. Similarly, those working on mainly Frascati R&D activities were more likely to have received funding than those mainly working on other R&I activities, with the exception of funding from private-sector-funded talent schemes or fellowships.

---

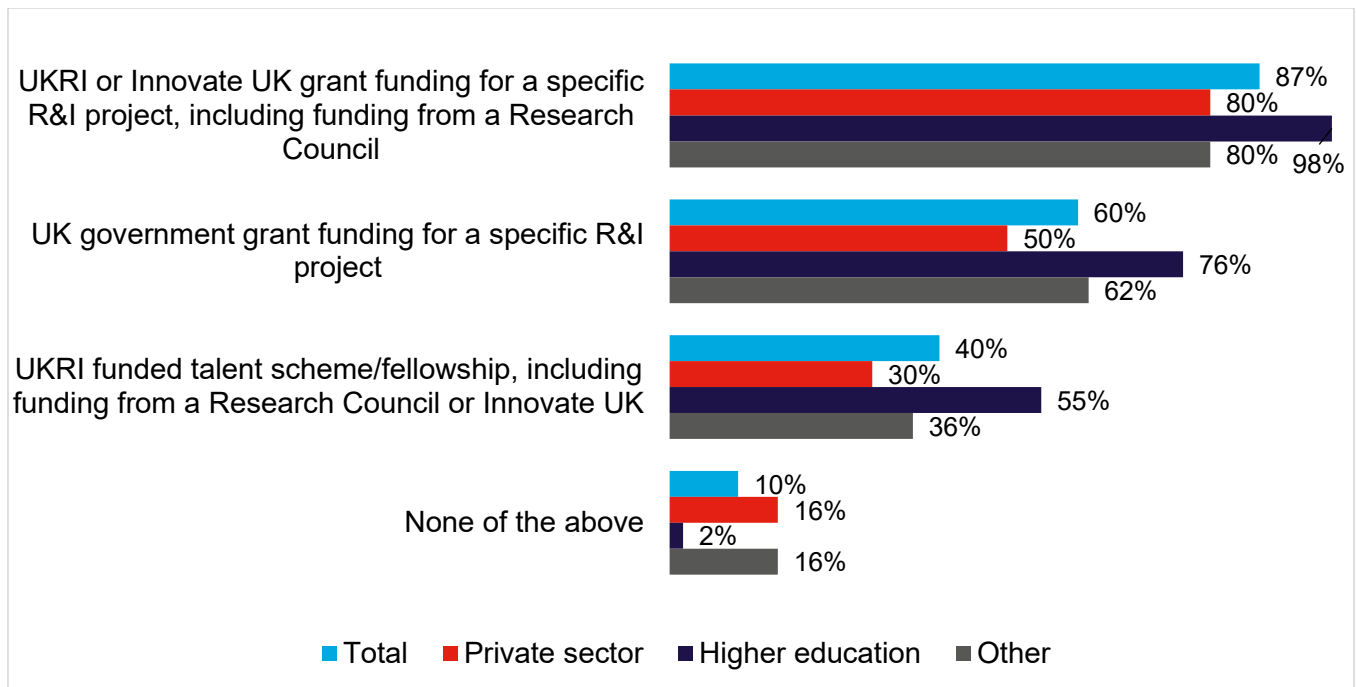
<sup>37</sup> <https://www.ukri.org/about-us/strategy-plans-and-data/annual-report-and-accounts/>

**Figure 5.5: Grants received by survey respondents**



Base: All respondents (7,519). Private sector 1,793; Higher Education 5,130; Others 1,379. Total %s are weighted, individual sector %s are not.

**Figure 5.6: Grants applied for by survey respondents**



Base: All respondents (7,519). Private sector 1,793; Higher Education 5,130; Others 1,379. Total %s are weighted, individual sector %s are not.

When asked to suggest in their own words how the UK government could support them in their R&I career, over half of respondents mentioned some form of financial support, and this was the type of support most often mentioned overall. 487 respondents mentioned increasing grant support specifically. Other common suggestions relating to financial support were for longer-term financial support or more consistent and stable funding, a fairer distribution of funding, improved management of grant funding, and more grants for small projects. 388 respondents wanted more financial support for basic research specifically, and a similar proportion wanted more financial support for doctoral students.

## 5.4 International mobility and how the UK can attract global talent

### Working outside the UK

The UK has a highly mobile and international R&I population. Over a tenth (14%) of those surveyed were non-British citizens, and a further tenth (11%) held dual citizenship. This matches with the 15% estimated using Labour Force Survey data<sup>38</sup>. The proportion increases when looking only at Higher Education researchers, where administrative data shows 37% holding non-British nationalities<sup>39</sup>.

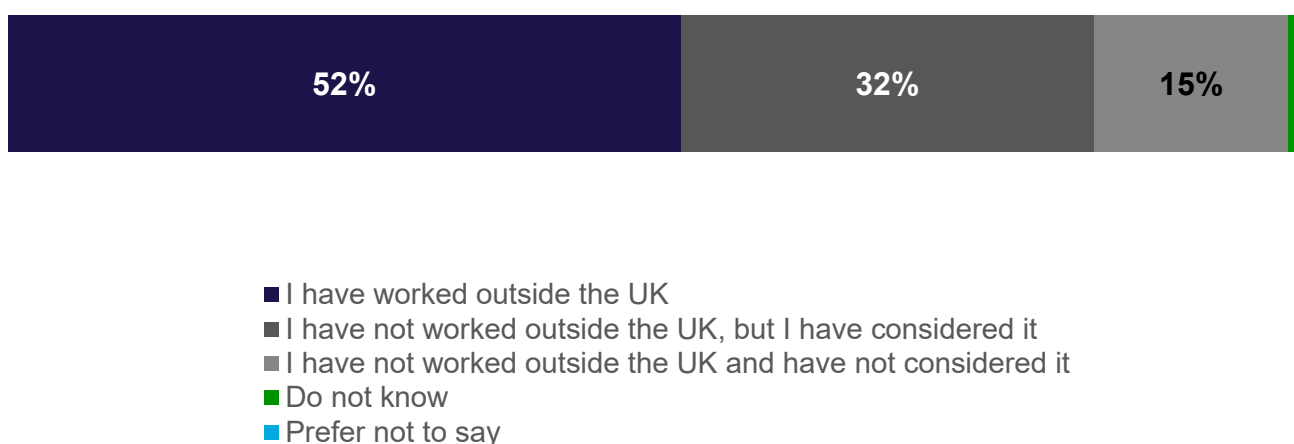
<sup>38</sup> <https://www.gov.uk/government/publications/research-and-development-rd-pipeline>

<sup>39</sup> Higher Education Statistical Authority data, 2020/21

The survey asked respondents whether they had ever worked outside the UK, defined as both working and living outside the UK. More than half of respondents (52%) reported having worked outside the UK in the course of their career in R&I, and a further 32% had considered doing so.

**Figure 5.7: International movement of survey respondents**

*Just thinking about your career in research and innovation, have you ever worked outside the UK, or considered working outside the UK? By working outside of the UK we mean both working and living in a country other than the UK*



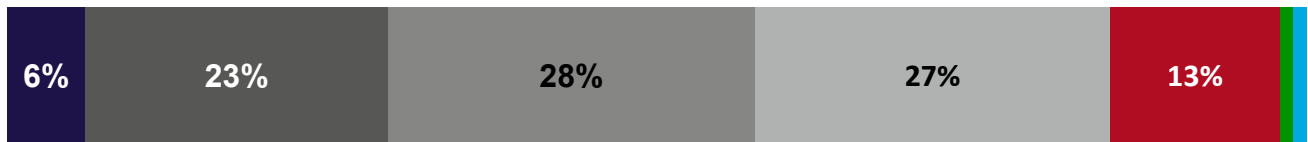
Base: All respondents (7,519)

The majority of respondents without British citizenship (85%) had worked outside the UK for part of their career, but this was also true for 45% of British citizens. Other respondent groups that were more likely to have worked outside the UK than the overall surveyed workforce were those doing research as part of a qualification (64%), those working in biological, mathematical and physical sciences (61%), and those who were older and/or had had longer careers in R&I. Those working in the private sector were less likely to have worked outside the UK than academics. However, those who had worked outside the UK still represented at least half of both groups, with 51% of those in the private sector having worked abroad and 55% of academics having worked abroad. A similar pattern appears when comparing those working on Frascati R&D activities versus those working on wider R&I (53% and 49% respectively).

When asked if they would consider working outside the UK in the next 5 years, a smaller proportion (29%) said that they were likely to work outside the UK, and four in ten (41%) said that they were unlikely to work outside the UK.

### Figure 5.8: Planned international movement of survey respondents

*Specifically thinking about the next five years, to what extent would you consider working outside the UK?*



- Already have definite plans to
- Would strongly consider
- Might consider
- Unlikely to consider
- Would definitely not consider
- Do not know
- Prefer not to say

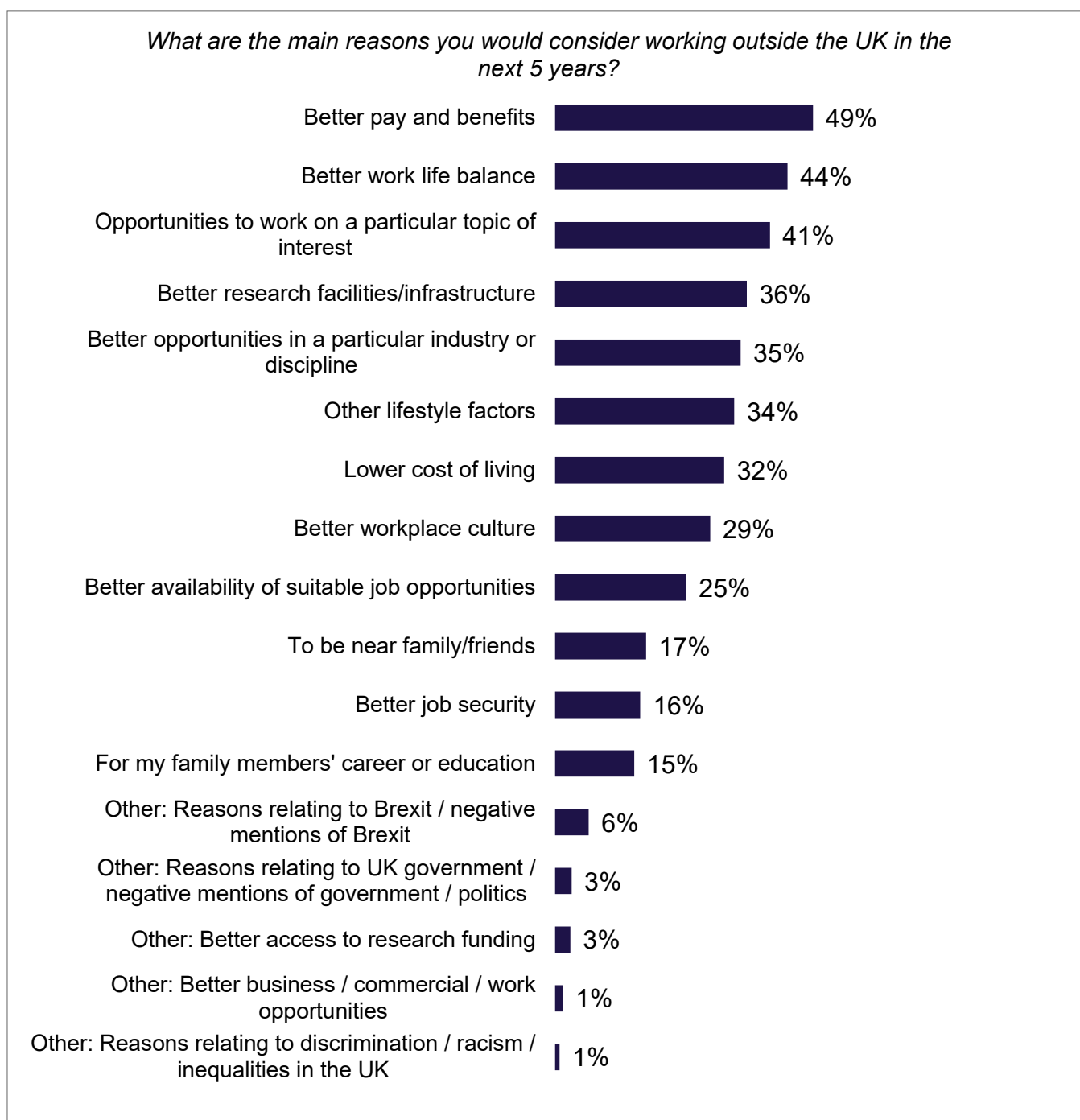
Base: All respondents (7,519)

Participants who said that they would consider working outside the UK in the next 5 years were asked what their main reasons would be for this. Half (49%) said that better pay or benefits were a factor, with a similar proportion of British and non-British citizens identifying this as a reason. Non-British citizens were more likely than British citizens to cite personal reasons for planning to work outside the UK in the next 5 years, including a lower cost of living (39%), to be near family and friends (46%), their family members’ career or education (20%), and reasons relating to Brexit (8%), as well as better job security (19%). Meanwhile, British citizens were more likely to cite reasons relating to their career, such as opportunities to work on a particular topic of interest (43%), better research facilities/infrastructure (38%) or better opportunities in a particular industry or discipline (37%).

Academics were significantly more likely than those in the private sector to answer that better pay and benefits (60%), a better work life balance (52%), better research facilities/infrastructure (48%) and better workplace cultures (39%) were reasons as to why they would consider working or are planning to work outside the UK in the next 5 years.



**Figure 5.9: Reasons those in the UK R&I workforce are considering working elsewhere**



Base: All respondents who would consider working outside the UK (4,239)

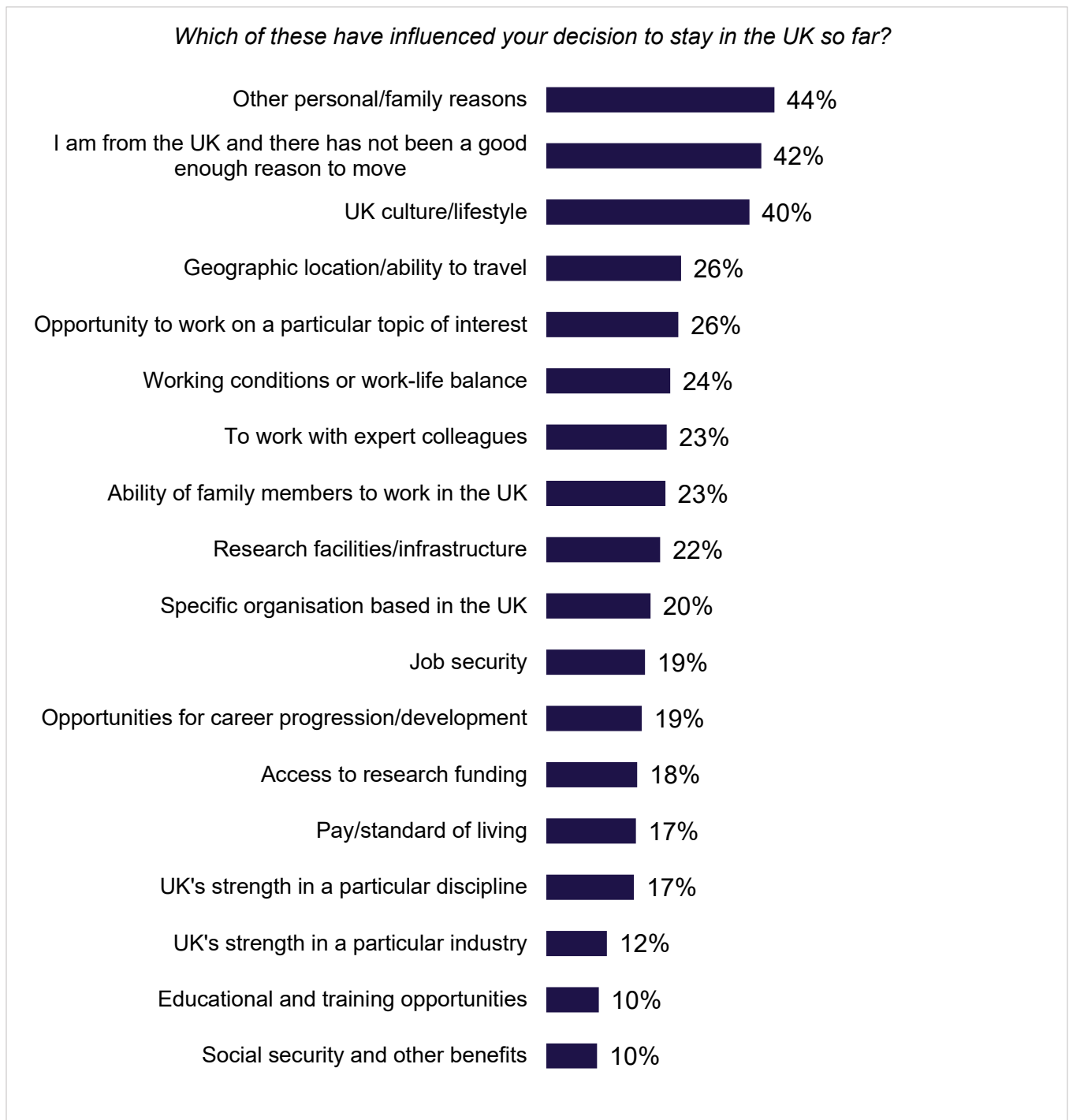
Respondents were also asked what factors had influenced their decision to stay in the UK so far. The most frequent responses were other personal or family reasons (44%), that they were from the UK and there has not been a good enough reason to move (42%), and UK culture/lifestyle (40%). A quarter said that the UK's geographic location and ability to travel (26%), the opportunity to work on a particular topic of interest (26%), and/or working conditions or work-life balance (24%) had kept them in the UK. This is shown in Figure 5.10.

Non-British citizens were significantly more likely than British citizens to name most of these factors as having influenced their decision to stay in the UK so far. The most frequent responses amongst non-British citizens were:

- opportunity to work on a particular topic of interest (41%)
- research facilities/infrastructure (40%)
- opportunities for career progression/development (37%)
- to work with expert colleagues (34%)
- UK culture/lifestyle (34%)
- access to research funding (32%)
- other personal/family reasons (32%).

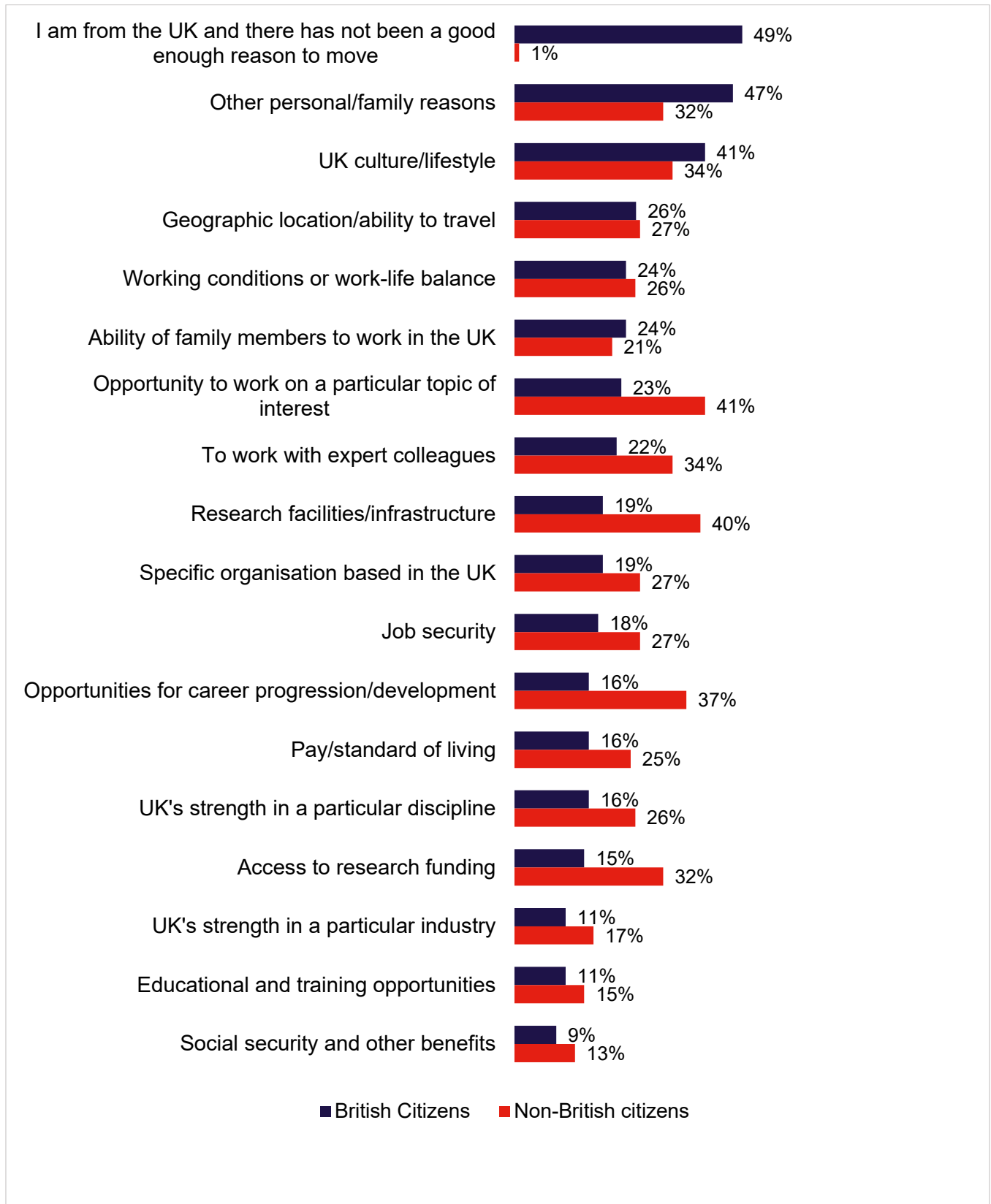
A comparison between British citizens and non-British citizens is shown in Figure 5.11.

**Figure 5.10: Reasons those in the UK R&I workforce have stayed in the UK**



Base: All respondents (7,519)

**Figure 5.11: Reasons British and non-British citizens in the UK R&I workforce have stayed in the UK**



Base: All respondents with an answer to the question about considering/having worked outside the UK, that hold British citizenship (6,347); All respondents with an answer to the question about considering/having worked outside the UK, that do not hold British citizenship (1,036).

Academics were significantly more likely than those in the private sector to name the following factors as having influenced their decision to stay in the UK so far: opportunities to work on a particular topic of interest, working with expert colleagues, or research facilities or infrastructure (all 30%), job security (29%), the ability of family members to work in the UK (26%), access to research funding (25%), the UK's strength in a particular discipline (24%), opportunities for career progression and development (22%), and educational and training opportunities (13%).

On the other hand, those working in the private sector were more likely to name UK culture/lifestyle (42%), working conditions or work-life balance (26%), and the UK's strength in a particular industry (16%) as factors that have influenced their decision to stay in the UK so far, compared to academics.

## Barriers to working in the UK

Removing barriers to attracting international R&I talent is key to meeting government's R&D ambitions. Non-British citizens in our sample were asked to identify issues that make it more difficult for them to work in the UK. While 1 in 4 respondents (25%) reported not facing any challenges that made it more difficult to work in the UK, the majority had faced at least some difficulties.

Respondents were asked to select which factors, if any, they found difficult about living in the UK<sup>40</sup>. The most common answers to this question related to pay and benefits, and trying to maintain their standard of living; almost a third of non-British citizens in our sample (30%) identified this as something which made it more difficult to work in the UK. This was followed by a quarter (24%) who said that immigration and visa requirements made it more difficult to work in the UK, 15% who answered that finding adequate accommodation was a barrier, 14% who answered that the availability of suitable opportunities to advance their career made it more difficult, and 14% who said that working hours made it more difficult to work in the UK.

Almost four in ten (38%) of non-British citizens who worked in a Higher Education institution identified maintaining their standards of living as something which made it difficult to work in the UK, which was significantly more frequent than those in the private sector, where only two in ten (18%) noted this as an issue for them.

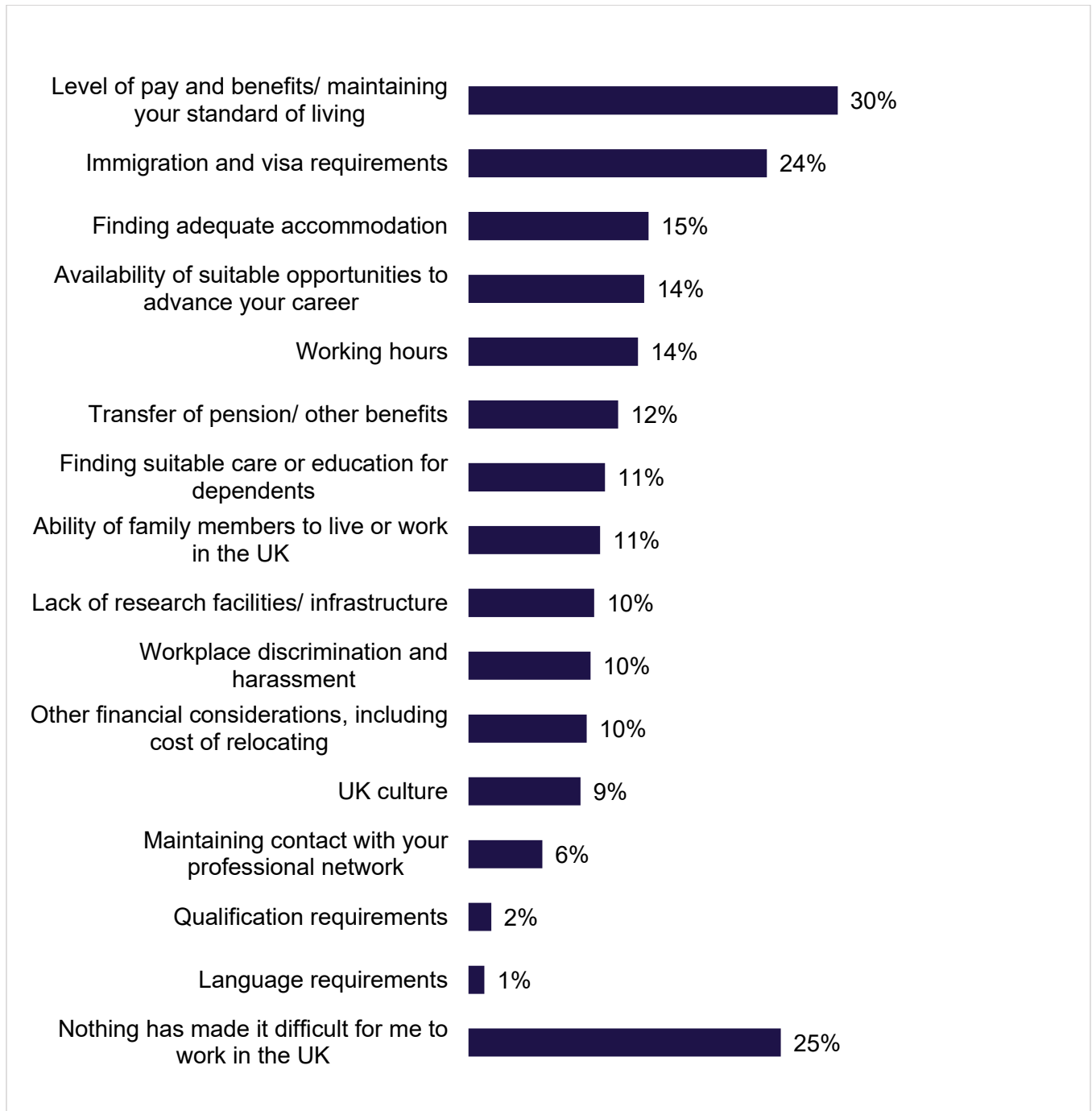
Non-British citizens working in medicine, dentistry, and health (36%), biological, mathematical, and physical sciences (37%), engineering and technology (38%), and architecture and planning (45%) were significantly more likely than non-British citizens as a whole (30%) to identify maintaining their standard of living as an issue that made it more difficult to work in the UK. Non-British citizens in the biological, mathematical, and physical sciences (28%) and social studies (29%) were significantly more likely than the total of non-British citizens (24%) to

---

<sup>40</sup> Respondents were asked to select the most challenging issues for them from a list provided, and could select up to five.

identify immigration and visa requirements as an issue making it more difficult for them to work in the UK.

**Figure 5.12: Barriers to working in the UK**



Base: All non-British citizens and those with dual citizenship (1,955)

When asked to describe in their own words how they thought the government could support them better in their R&I career, one in ten of our sample mentioned the EU or immigration. About half of these specifically said that improved immigration policies, easier movement, and the easier recruitment of researchers across borders would help them in their career.

## **International workforce and international mobility**

The UK R&I workforce is dependent on a global labour market. One quarter of the UK R&I workforce holds non-UK citizenship (including dual citizenship) whilst almost half (46%) of British citizens have worked outside the UK and a further third (36%) have considered it. Therefore, a key dimension in maintaining a UK R&I workforce is attracting talent from elsewhere and retaining talent that is already working here.

Reasons for working in the UK vary between British and non-British citizens. For the former, inertia and lifestyle factors are the main reasons, with the nature of work opportunities a secondary consideration, alongside good working conditions and work-life balance. Non-British citizens have been primarily attracted by the career opportunities offered by working in the UK, including working on topics of interest, the opportunity to work with expert colleagues, research facilities and career progression. Access to research funding was also a more important attraction of the UK for non-British citizens than British citizens.

Almost one third (29%) of the UK R&I workforce surveyed report that they are likely to work outside the UK in the next five years – 27% of British citizens and 41% of non-British citizens. Those that plan to work abroad are more likely to be of Black/Black British, Mixed, and Other ethnic groups and to be younger (in terms of both age and career length). The main push factor for those considering working abroad was pay (49%). However, other factors varied considerably based on citizenship. For British citizens job content (working on topics of interest, research facilities and better opportunities) were most important compared to non-British citizens; these are very similar to the reasons non-British citizens give for working in the UK. For non-British citizens, wanting to be near family and friends, and lower cost of living were the most important. People working in academia were more likely to give working conditions as reasons for wanting to work abroad, such as better pay, work/life balance, research facilities, and workplace culture.

Three-quarters of non-British citizens faced challenges when working in the UK, rising to nearly 4 in 5 (79%) of those working in Higher Education. Those in younger age groups (16-44) were more likely to have experienced challenges working in the UK. Pay/standard of living was the main challenge (30%) followed by immigration/visa requirements (24%).

## 6. Impact

R&D and innovation is vital for economic growth and productivity improvements as well as creating more and better-paid jobs. Innovations in medicine have doubled the average persons' life span; electricity and household machines have made it possible to enjoy leisure saved from gruelling household work; technology and innovative business models made it possible for ordinary citizens to travel around the globe; the internet has enabled us to engage with the world from our homes; and our scientific research, entrepreneurship and inventiveness led, amongst other things, to the development of vaccines for COVID-19 in record time.<sup>41</sup> This section provides a detailed breakdown of outputs produced by the R&I workforce and the perceived and potential barriers to their work having an impact.

### 6.1 Types of impact

#### Outputs over the last 12 months

The survey asked respondents what types of outputs their work had fed into over the last 12 months. The creation of new knowledge was most often selected here: three-quarters of the R&I workforce surveyed (75%) and 89% of academics reported that their work had fed into new knowledge which they discussed with colleagues. A smaller proportion (61%) of those who spent most of their time on non-Frascati R&I activities identified this as an output of their work, although this was still the most commonly identified output for this group.

In terms of more tangible outputs, around half of respondents had contributed to publications in academic journals (54%). More than 9 in 10 academics (93%) reported this as an output of their work, with lower proportions in other sectors, although a quarter of private sector researchers (25%) had also contributed to a journal publication in the last 12 months.

A similar proportion of the overall workforce had produced data outputs such as datasets or databases (48%). Around half of respondents (51%) had also shared their knowledge via education, training or mentoring: this was unsurprisingly higher in the education sectors (75% and 73% in HE and FE respectively) and lowest in the private sector (33%).

Meanwhile, private sector workers were more likely to report that their work fed into intellectual property and licensing (49% of private sector workers compared with 14% of Higher Education workers), prototypes or new products or processes (48% compared with 10% of Higher Education workers), software and technical products (45% compared with 17% of Higher Education workers), commercialising research or new technology, without seeking intellectual

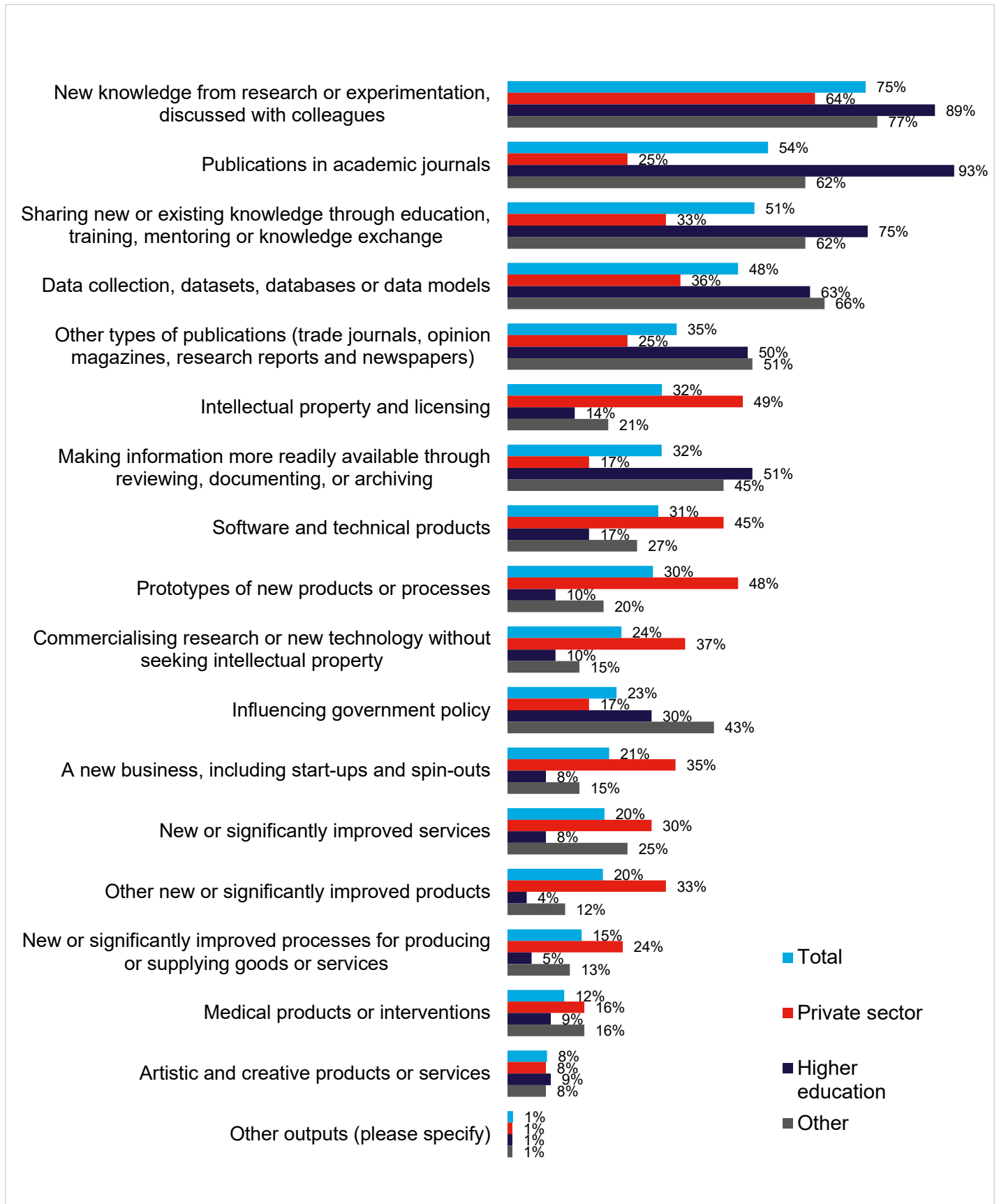
---

<sup>41</sup> BEIS (2021d). *Evidence for the UK Innovation Strategy*. From: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1023586/evidence-for-innovation-strategy.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1023586/evidence-for-innovation-strategy.pdf)



property (37% compared with 10% of Higher Education workers), and a new business, including start-ups and spin-outs (35% compared with 8% of Higher Education workers).

**Figure 6.1: Proportion of the workforce by sector producing each R&I output over a 12-month period**



Base: Participants who are working (7,499). Private sector 1,790; higher Education 5,115; other 1,374. Total figures are weighted, individual sector figures are not. Respondents could select multiple options.

Those with longer careers were more likely to have published in an academic journal in the last 12 months (only 10% of those with less than 2 years' experience had done this, vs. 62% of those with more than 15 years' experience). On the other hand, those with a career length of between 2 and 5 years were more likely to have had their work fed into intellectual property and licensing (41%) than those with longer careers.

## 6.2 Suggestions for supporting impactful research

In the open-ended question about how government could support their R&I career, respondents made suggestions relevant to supporting impactful research:

- 536 respondents suggested increased financial support for new businesses, start-ups or SMEs. Private sector respondents and those in the public sector outside of government and the NHS were most likely to suggest this.
- 248 respondents (82% of whom were in the private sector) wanted more government support in relation to intellectual property, such as support to address patent protection or help with the associated costs.
- 217 respondents suggested that government should do more to promote the value of research. Again, Higher Education respondents were more likely to suggest this, with 59% of respondents suggesting this being from Higher Education.
- 184 respondents (86% of whom were in the private sector) suggested increased funding for commercialisation phases of research. 45 wanted support to improve the Technology Readiness Level of their projects and 31 wanted support for prototype development in particular. On the other hand, 104 respondents wanted less pressure to make research marketable or commercialised.
- 98 respondents wanted better access to data and improved data-sharing. Respondents from public-sector research organisations were most likely to suggest this.
- 70 respondents wanted better access to policymakers and opportunities to influence policy, and 42 wanted more communication about government priorities and objectives.
- 59 respondents suggested better communication about innovation outcomes and new findings.
- 52 respondents, 85% of whom were from Higher Education thought that the way the impact of research is appraised (for example through the REF) is too narrow and does not take into account smaller and more varied ways research can have a positive impact on society, and/or the contribution of more junior researchers or research support roles to the impact of research.
- 25 respondents wanted more financial support for horizontal innovation (technology transfer between sectors).

The findings discussed in section 5.3 relating to the burden of administrative tasks and processes also suggest an area where obstacles to impactful research could be tackled.

Overall, 1,761 respondents (23%) made suggestions related to streamlining and simplifying processes, most often in relation to grants and funding applications. Those working in higher and further education were more likely to comment on this compared to other sectors (26% of those working in Higher Education and 31% of those working in further education made suggestions relating to this).

## 7. Conclusions

The R&I Workforce Survey 2022 is the first survey of its kind and fulfils one of the Government commitments under the R&D People and Culture Strategy. The survey achieved a total sample of 7,519 respondents from a range of backgrounds, including different sectors and occupations within R&I. It gives policymakers an insight into the R&I workforce in the UK, covering members of both the innovation and research and development workforces. It also provides crucial information about activities, skills, careers, enablers, barriers, and impacts of the R&D workforce in the UK, and increases the usefulness of existing datasets. The survey was developed in partnership with R&D funders to ensure its usefulness to a variety of organisations involved in the UK's R&I system.

This survey provides cross-sectional data rather than trends in the R&I workforce. It will require repetition to develop a time-trend series and keep findings current. Further to repeating the survey in the future, there are plans being developed for more in-depth qualitative research, which would provide a more detailed explanation of people's career paths and choices, issues they face and opportunities they value.